Courseware in Special Education

Planning Services

Alberta
EDUCATION

COURSEWARE IN SPECIAL EDUCATION STUDY

- by -

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Prepared under Contract
with
Alberta Education

May, 1983

Alberta
EDUCATION

Devonian Building, West Tower, 11160 Jasper Avenue, Edmonton, Alberta, Canada T5K 0L2

May, 1983

To The Reader:

Re: Courseware in Special Education

We are pleased to provide this copy of the report concerning microcomputer courseware in special education. The catalogue information about courseware represents a beginning in collecting information in this rapidly expanding field.

At this time none of the courseware packages described in the catalogue section of the report have been evaluated and approved by Alberta Education. In due course many will be evaluated by the Computer Technology Project Clearinghouse of Alberta Education. You will note, however, that many of those listed have been evaluated by the authors for technical adequacy only.

The catalogue information is also available on Apple II diskette.* It may be purchased in this form from the following source:

School Book Branch
Alberta Education
10410 - 121 Street
Edmonton, Alberta
Canada T5N 1L2
Telephone 403-427-2767

List price: $15.00
(less 15% discount to qualified educational institutions)
*NOTE: that a DB Master Program is required to access information.

Yours truly,

H.I. Hastings

H.I. Hastings
Director
Planning Services

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EXECUTIVE SUMMARY

Why the Courseware in Special Education Study

Computer literacy for all Alberta students requires the availability of courseware for special students. The high return on investment in this area has been identified by other Alberta Education studies. At present, there is not much information assembled in the Special Education courseware area. Many educators may be making computer and courseware purchases without realizing the special requirements needed to make computer aided instruction for special students work.

Findings and Conclusions

Courseware availability in the physically handicapped area is well developed and there is a proliferation of approaches, courseware, aids for non-computer curriculum and aids for accepted courseware in use. Since there is an explosion of microcomputer use in Special Education, over 300 courseware packages consisting of one or more separate computer programs have been identified (with limited evaluations performed on some) in this study. Courseware for the developmentally handicapped is between the initiation phase and the exponential growth phase of use. There is an emerging trend towards multi-media, multi-sensory, multi-learning modality approaches to Special Education instruction. This results in a blurring of the definition of courseware independent of its microcomputer component basis.

Recommendation

The summary of recommendations, Section I, has not been priorized in this study. The establishment of a central location of evaluation and information dissemination with a stable computer hardware configuration for testing or demonstration is recommended. This microcomputer based system should provide an electronic bulletin board information exchange for all special educators, especially rural ones, and interested individuals. Courseware expansion in the developmentally handicapped area is recommended with the possibility of this being done within Alberta. Maintenance of the existing courseware catalogue produced in this study is recommended.

Acknowledgements

This study was directed through a steering committee consisting of:

Dr. Clarence Rhodes, (Chairman) Research Consultant
Dr. Jean Moore, Special Education Curriculum Development
Dr. Harvey Finnestad, Sensory Multihandicapped Program
Dr. Jim Thiessen, Computer Technology Project

Each of the members contributed positive direction through lengthy committee meetings and in follow-up discussions.

Art work was provided by Bob Schimmel

To obtain catalogue section copies of this report on Apple II DB Master Diskettes containing an annotated version of identified courseware sources contact:

School Book Branch Alberta Education 10410 - 121 Street Edmonton, Alberta T5N 1L2	List price: $15.00 (less 15% to qualified education institutions)

CANADA Telephone 403 - 427-2767, Extension 37

COMPUTERESE

I'm just getting into computers,
I know there is software and hard,
And then I hear talk of a menu
But it's not Table d'haute on a card;
Mention is made of a RAM and a ROM,
A programme, loop, bank and such things;
My floppy disc's in
My file's taken out,
They'll be telling me next that it sings °°°
And so I am writing a poem,
My mouth-stick is tapping the keys,
This doggerel really is finished
So switch on the print-out now please.

Doris Manning 18.3.83.

Interface, April 1983. Robin Nixon, Editor

I SUMMARY OF RECOMMENDATIONS

The following recommendations are not listed in any priorized manner. They represent a cross section of possible future suggestions.

It is recommended that Alberta Education:

Recommendation 1:

Continue the evaluation of all courseware and aids identified and make this an on-going project. Continue to maintain this in Apple II or other microcomputer compatible form. Create a multi-disciplined team with skills in special education and computer technology.

Recommendation 2:

Create an information resource position for special education whose responsibilities include:

- joining the School Practices Information Network.
- joining Special Net - the Special educators Network.
- joining HEX - The Handicapped Educational Exchange.
- joining any other computerized bulletin board that springs up in the special education area. Ones that are dial-up available exist in San Francisco, Vancouver and elsewhere.
- reviewing on a regular basis the above information bulletin boards.
- subscribe to Mean Brief of the Microcomputer Educational Applications Network.

- perform a site visit review and report on the centralized approach to special education in England. The four service sites in Britain use the centralized approach recommended elsewhere in this report.

Recommendation 3:

Expand upon and distribute the bibliographic citations listed in this report. Make available this information to special educators and interested individuals in diskette form if not on a dial-up communication basis.

Recommendation 4:

Create an Alberta-based individual educational program, Apple II diskette compatible, with an approved software publisher package. This involves selecting one publisher and asking for modifications to his data diskette such that the resultant goals, tasks and missions of instruction are directly related locally to the approved Alberta Curriculum.

Recommendation 5:

Enter into a strong relationship with Trace at the University of Madison/Wisconsin. This center has the most complete collection of current aids and the center is on the leading edge of developments in this area. Research is conducted at Trace for many brand names in this special education area including Prentke Romich Company and others.

Recommendation 6:

Relax the criteria of courseware evaluation in the special education area so that the one-offness of software authored for unique students may be identified and retained somewhere within the education system even if the courseware is not approved. Although Apple II compatible courseware is emphasized since there is more of it than any other in this area, other software should be identified and retained.

Recommendation 7:

Create a central location of one complete configuration (see Exhibit #6) with all current peripherals and hardware that remains fixed for special educators, software developers, and demonstrators. This location could be in Calgary at the Technical Aids Lending Library of the Calgary Children's Hospital, at a special education school or at an Alberta Education Materials Resource Center.

A central registry of software should be retained in the Computer Technology Clearinghouse. The configuration should have at a minimum Ascii Asyncronous communications and TTD for deaf patrons or educators.

Recommendation 8:

Create a special educator handbook that attempts to answer:

° how to select the most suitable computer for application with handicapped individuals by knowing your purpose.

- how to select a computer for application in a special education classroom when one only with limited peripherals may be purchased.
- how to interface an Apple II with a handicapped student through either custom software, operating system modification, keyboard emulation, and/or front-ending the microcomputer with another device, and the rules of thumb to observe when doing the interface.
- how to author special education courseware or how to take existing or approved courseware and tailor it to an individualized instruction program.
- how to develop individualized lesson plans for special education students using a microcomputer.

Recommendation 9:

Create a single source information network of information sources. This network should ultimately be a computerized bulletin board with communication capability for special educators in both rural and urban Alberta school jurisdictions. Commission a study to compute the costs of this including the database maintenance and using Telidon as the communication service delivery provider.

Recommendation 10:

Commission a study to evaluate the development of a Telidon handicapped student interface in which the non-computer curriculum material, the computer courseware, and Telidon would have a common communication approach.

This will prevent proliferation of approaches without control.

Recommendation 11:

Investigate and evaluate making the Computer Technology Clearinghouse information requirements on-line and TTD (deaf message switching) compatible.

Recommendation 12:

Evaluate taking existing Alberta based courseware and making it Apple II compatible - in particular the basic living skills software in use at various provincial learning institutes. This evaluation should include special education software running under the Plato operating system.

Recommendation 13:

Since Alberta has a temporary lead in courseware in the developmentally handicapped area, investigate how best to exploit that lead as an Alberta resource. Similarly, review and evaluate missing technologies and learning modalities.

Kinesthetic and/or tactile learning appears to be an obvious area.

Recommendation 14:

Survey the courseware approaches of all other educational jurisdictions and relate these approaches to Alberta. There is a myriad of approaches in the special education area and this may assist in the software approach Alberta takes in other subject areas.

II INTRODUCTION

OVERVIEW

One of the developments of the microcomputer's introduction into the educational setting has been the definition of the microcomputer's place in Special Education. Although the use of medium or large computers in educational and rehabilitative situations has been clearly established, the justification of similar microcomputer uses has yet to be made. During the last half of 1982 and early 1983, this justification was supported in numerous publications in addition to the support given in the internal reports of Alberta Education. A result of the demonstration of use was the commissioning of a study of the availability of Courseware in Special Education. Courseware was defined to be sufficiently broad enough to include all uses of microcomputers in special education.

In the following pages in this section a description of the background, the approach, the findings, and the evaluations of the study is presented. Subsequent sections describe student instructional strategies; present a brief review of an aids catalogue; and identify and/or evaluate courseware.

BACKGROUND

Contributing Factors

This study was the result of many contributing factors. A review of the literature shows an information explosion in the use of micro-computers to assist in Special Education. One publication, Computer Technology for the Handicapped in Special Education and Rehabilitation: A Resource Guide by Gary Nave, Philip Browing, and Jim Carter from the International Council for Computers in Education, lists over 250 citations of literature with most being authored in the last 3 years. Many periodicals and journals with established positions in either the educational setting or the microcomputer area have produced issues dedicated to the theme of the microcomputer (or of micro electronics) and the handicapped (or the exceptional student). These issues include the September, 1982 issue of Byte "Computers and the Disabled"; the March, 1983 issue of Educational Computing "Learning to Cope"; the October, 1982 issue of Exceptional Children "Microcomputers' Place in Special Education" and a host of others listed in the bibliography. Further, handbooks such as F. Taber's Microcomputers in Special Education March, 1983 and conference tutorials such as Computers and the Handicapped by the National Research Council October, 1982 have been produced.

Alberta Education completed a study in June, 1980 by H. J. Hallworth and Ann Brebner entitled "Computer Assisted Instruction in

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Alberta Education completed a study in June, 1980 by H. J. Hallworth and Ann Brebner entitled "Computer Assisted Instruction in

Schools: Achievements, Present Developments, and Projections for the Future." One of the priority areas for CAI identified within that study was handicapped students. "CAI has proved to be a surprisingly successful way of educating the handicapped whenever it has been tried. Further, it is a cost-effective method as these are students whose education is otherwise expensive, with many of them requiring constant individual assistance". ibid pg. 219. The advent of the microcomputers' widespread use and resultant computer literacy has made CAI for the exceptional student even more cost-effective and educationally satisfying. These educational trends have not as yet peaked.

It is interesting to note that in general the special education area has unique problems of production, marketing, and distribution due to the "thinness" of the market [Education TURNKEY Systems Inc. March, 1983]. However, numerous catalogues of products in the special education area have been produced with many relating directly to the microcomputer and its required courseware. In a cost comparison of non-handicapped versus handicapped students TURNKEY Systems Inc. reported factors in range between three and fifteen to one for cost categories related to facility maintenance/operation and services/administration. The same study described the special education market needs for CAI as perceived by special education teachers to be 5 to 1. This study also projected that the number of microcomputers in regular education in the instructional and administrative areas would increase by 1985 to be 4 times the 1982 numbers of 100,000 and 25,000 units respectively. Whereas the number of microcomputers in special education in the instructional and administrative areas would increase by 1985 to be 8 times the 1982 number of 15,000 for the instructional area and 2.5 times the 1982 number of 10,000 for the administrative area. Comparable ratios with lower base figures are hypothesized for Alberta.

Definitions

Like most areas that the personal computing industry becomes involved in, the educational setting has had to define and re-define much of the language used to describe the microcomputer and its supporting concepts. Unfortunately computing definitions are at times imprecise due in part to the need for vendors to make product differentiations. The key definition in this study concerns courseware. By courseware, we do not mean firmware, hardware, software, people-ware, or lessonware. We take courseware in its broadest definition as it relates to making a microcomputer perform as would any educational media. In Exhibit 7 we show how we classify courseware. The Glossary of Terms from the Computer Technology Clearinghouse's evaluator's guide is attached in Appendix C.

Learning Modality

The instructional use of CAI for special education students has certain assumptions that are accepted for this study. A Review of the literature *on Learning Modalities and Style, McCann, March 1983 has demonstrated that it is an assumption that good instructional courseware should support the preferred learning modality of the student. For

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* See Appendix F

example if a student is physically disabled blind/deaf then kinesthetic instructional support should be provided. Although strengthening of an impaired learning modality by, for instance, drill and practise of a visually impaired student on colours is an alternative approach, no courseware was located that specifically addressed the issue, even though the need for multi-sensory CAI had been identified by numerous educators including Ann B. Brebner and H.J. Hallworth, "How Computers Can Help Those With Special Needs", CIPS Review, DECEMBER 1981.

Relationship to Curriculum

It becomes immediately apparent to educators that there is an "Essential Relationship with Curriculum", (Colin Richards, Newcastle Semerc, March 1982) between microcomputers and special education. The education of any child has common goals with all children. "The help required for children with special needs to achieving their goals is dependent upon the precise nature of their individual special educational needs", ibid pg 1. The exploration of this relationship was considered external to the scope of this study as it was deemed more important at this time to get the identification of what courseware is available and how to classify it in focus before relating that courseware to curriculum.

SIMILAR SURVEYS

EXHIBIT #1

STATUS	ORGANIZATION	COMMENTS
1. COMPLETE	Vocational Study Center U. of Wisconsin-Madison	1% response on 10,000 mail-outs
2. COMPLETE	Department of Education England, Wales and Northern Ireland	Listing of all Federal Funded activities in area. 80% response.
3. COMPLETE	Trace U. of Wisconsin-Madison	4% response on 100 questionnaires including return media (diskettes)
4. IN PROGRESS	Gallaudet College Washington, D.C.	Used ADCIS Journal. About 2% response
5. IN PROGRESS	Waisman Centre U. of Wisconsin-Madison	In-home based courseware. 10% response on telephone survey.
6. STARTING UP	John Hopkins Baltimore, MD.	User group evaluations. Announced March 1983, Hartford CEC conference.

Approach and Methodology

The study consisted of a four phase approach made up of locating background information, collecting data, analyzing the data collected, and making subsequent recommendations. The background phase consisted of literature reviews and internal source reviews. A selected bibliography is located in Appendix B. The following sections of this report discuss the analysis and recommendation phases. This section discusses the exhaustive attempt to collect data including courseware for this study.

Similar Surveys

In the data collection phase of this study other similar surveys were uncovered. A partial listing of these surveys is identified opposite, Exhibit #1. These surveys show a difficulty in getting quality survey responses. This problem of response was subsequently related to the following issues:

- perhaps there was little development in the area.
- what courseware that has been developed had not been evaluated or replicated by other educators. The results were not reproduceable.
- there was a commercial opportunity and developers were not disclosing their work.
- the questionable ethics of those related to the microcomputer and educational areas with respect to copying had not been decided.
- the area is so large that no one has time to respond.

The issues necessitated as-complete-as-possible data collection phase.

EXHIBIT #2

COURSEWARE SOURCES OVERVIEW

1. Clearinghouses
2. Computerized Bulletin Boards
3. Handicapped Ham Radio Network
4. Publications
5. Associations
6. Manufacturers, Publishers, and Distributors
7. Educational and Rehabilitation Users
8. Known Authors
9. On-line Software Registries

Courseware Sources

Exhibit #2 opposite lists the generic sources approached either through mail-out questionnaire, telephone interview, or site visit. A sample of the questionnaire is located in Appendix D. Of interest to this study was that of sources searched only one source (Queue, a courseware clearinghouse), had an extensive list of available courseware that was software based in the special education area (about 141 individual programs). This was interpreted to mean that both "cottage industry" and "large publishing house" effects were still occurring in this courseware area. As is shown by the descriptions of the courseware collected in Sections IV and V, considerable software exists in the special education area as in other educational areas. This software has all the evaluation problems of other courseware areas such as Mathematics - little high quality or approvable quality material. A selected listing of sources approached is in Appendix A.

Findings and Speculations

The justification for the use of microcomputers in special education now appears unquestionable. There is an explosion of material in this area with a considerable number of emerging trends. Many educational institutions are developing an instructional technology curriculum in special education that can only continue this development of microcomputers. In a belt-tightening economy any marginal expenditures should be put where the return has the greatest pay-off.

The pay-offs seem greatest in special education. There seems to be no limit to the ingenuity of developments in courseware in special education. This is shown through some of the unclassifiable software listed in Section V (for example the Learning Box). The problem of the questionable ethics of copying of materials will only be aggravated by these trends. The force of legislation similar to that for the publishing industry will probably predominate.

Evaluations

Few evaluations of courseware and related materials have been performed. Microsift, some publications, authors and a host of others are attempting to perform evaluations in the special educational area. Evaluations can be described in many components. The scope of evaluations in this study was restricted as to whether the courseware performed in a technical sense. Was it internally consistent? There are emerging trends in evaluation that have been developed including an attempt at rigor such as Project Sector. The courseware identified herein will be subjected to further evaluations. Forty-two citations had technical evaluations performed and listed in this report. No instructional content evaluations have been performed at this step of the evaluation process.

III. STUDENT UNIVERSE DESCRIPTIONS

This section discusses learner modalities, instructional strategies, CAI resources and classification schemes. A classification model is adopted and the courseware identified in the data collection phase is sorted in terms of the model in Sections IV and V.

The Exhibit #3 opposite shows an analytic overview of this section of the report. A discussion of learning styles or modalities is given. This is followed by communication devices currently possible for special education students. A computer configuration capable of being used for generalized CAI in a special education classroom is then shown. Finally the conceptual model of describing the courseware found and/or evaluated is presented. Not discussed is this courseware's relationship to curriculum.

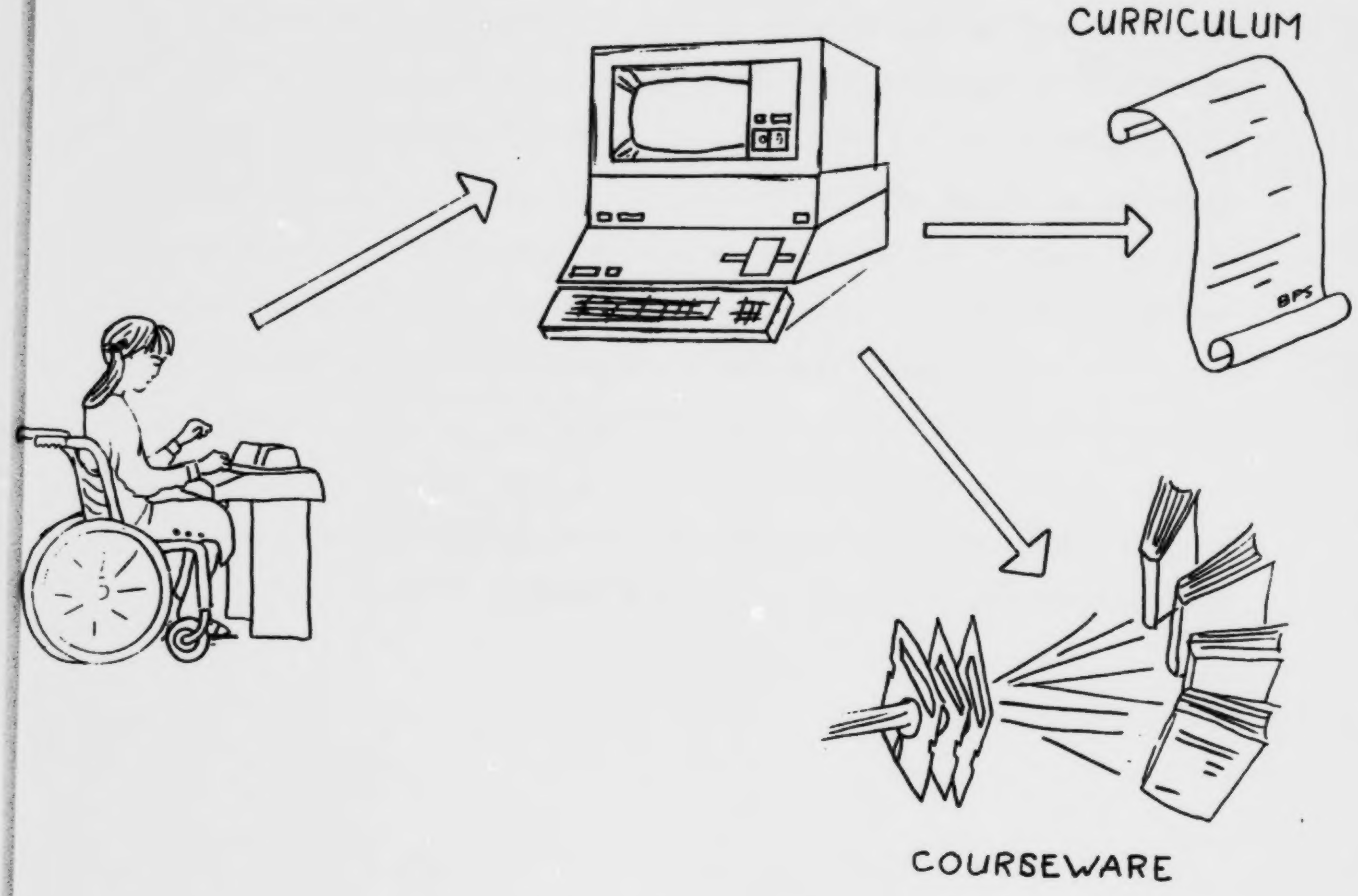
CURRICULUM
BPS
COURSEWARE

EXHIBIT 3. ANALYTIC OVERVIEW

Instructional Strategies

The Exhibit #4 opposite models a way of combining learning modalities with an instructional approach. Assessment and evaluation input involves reviewing all information available on the physical or developmental disability of the student. This is combined with the preferred learning modality of the student. For example, many learning disabled students may learn best through kinesthetic or multi-media approaches and an interactive "joy stick" or touch sensitive screen may be all that is required to use existing courseware. However, the above example only works when, along with teaching style, the educator has the skills in his teaching inventory to match the needs of the student. And, as well, CAI resources such as the courseware and hardware components are at the educator's disposal.

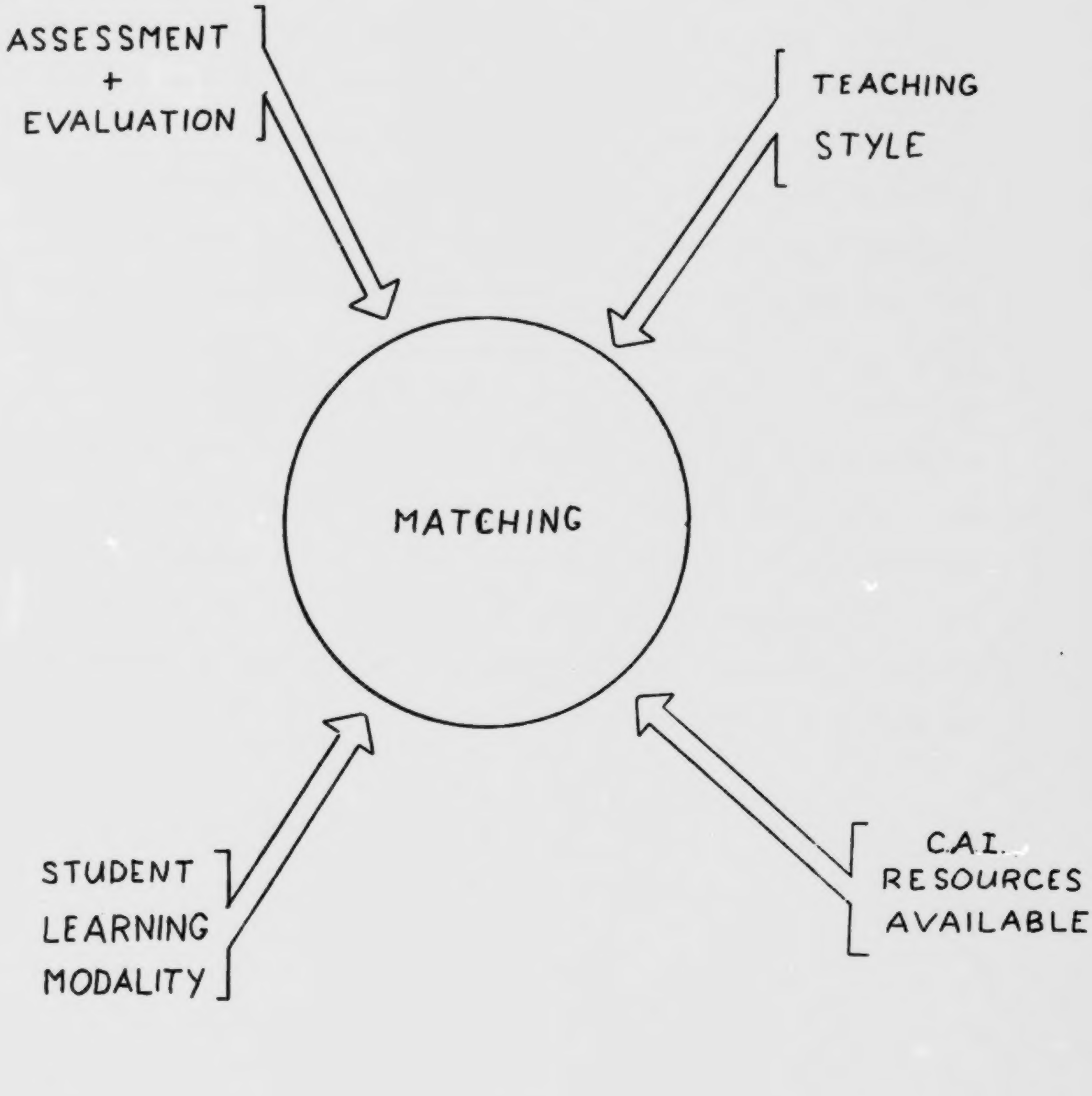
ASSESSMENT
+
EVALUATION
TEACHING
STYLE
MATCHING
STUDENT
LEARNING
MODALITY
C.A.I.
RESOURCES
AVAILABLE

EXHIBIT 4. INSTRUCTIONAL STRATEGY OVERVIEW

CAI Resources

Sensory Devices

The Exhibit #5 opposite shows the parts of the body presently possible to connect microcomputer input/output devices for physically disabled students. This exhibit is a modified picture of a catalog of control areas produced by the Children's Hospital at the Stanford Rehabilitation Engineering Center. When interfacing physically handicapped students with sensory devices other than the QWERTY keyboard (standard typewriter keyboard), control switches are one approach. Additional approaches include software modifications, or front-ending to either the courseware, the system software, or the interface controllers. Keyboard emulators are available that work with a myriad of communication aids. One novel approach to using existing courseware and microcomputer resources is produced by the Canadian National Research Council. This involves front-ending a microcomputer such as the Apple II with a Vic-20. The microcomputer front-end performs the interfacing functions unit to the student and whichever microcomputer the student must communicate with.

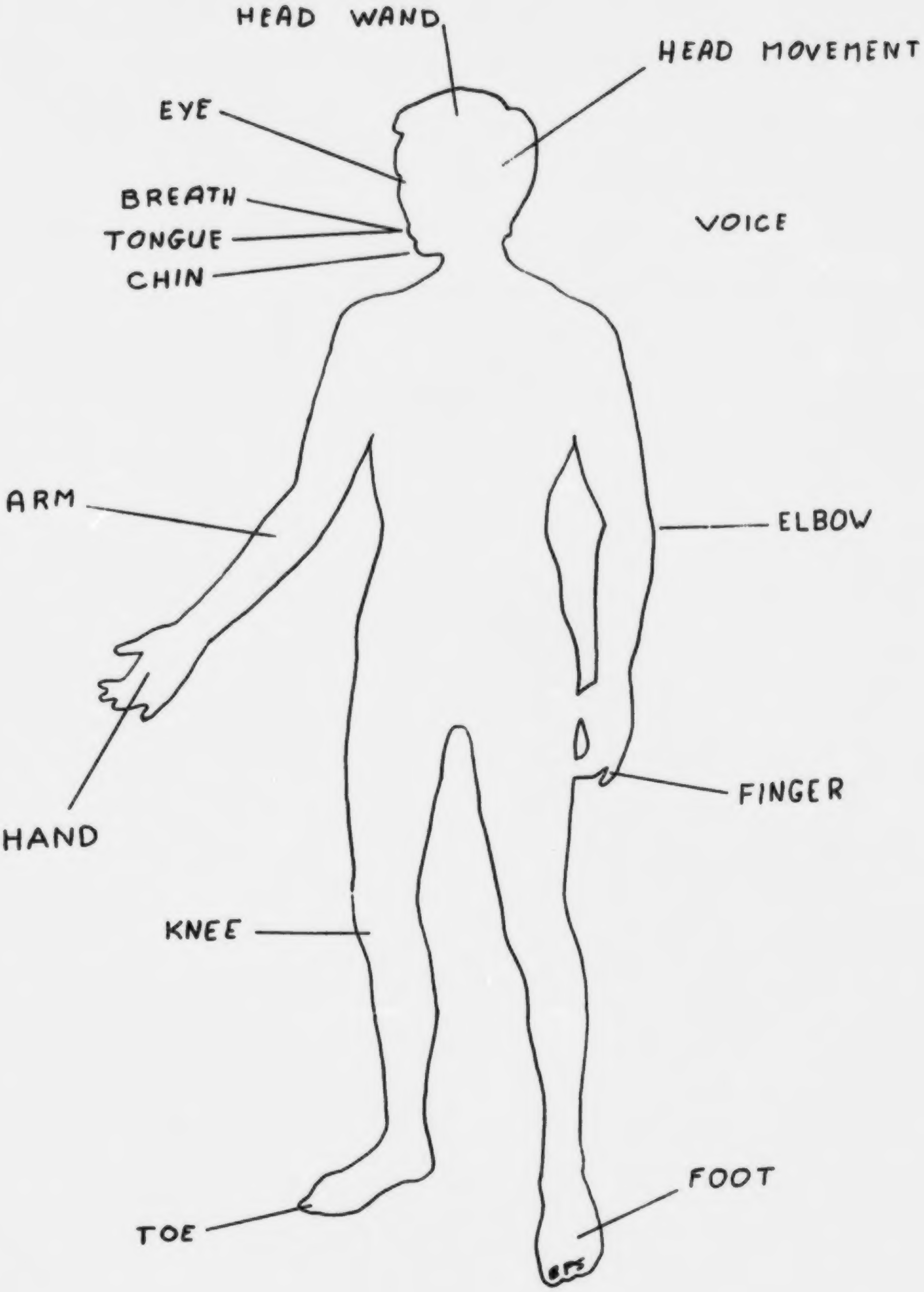
HEAD WAND
HEAD MOVEMENT
EYE
BREATH
TONGUE
CHIN
VOICE
ARM
ELBOW
HAND
FINGER
KNEE
FOOT
TOE

EXHIBIT 5. SENSORY DEVICE USE BY PART OF BODY

Computer Configurations

The Exhibit #6 opposite shows the options available for the physically handicapped to interface with existing courseware. This configuration shows important options when using courseware. A combination of devices may be required when interfacing any handicapped students. A multi-media approach is emerging as a trend in all courseware, not just special education.

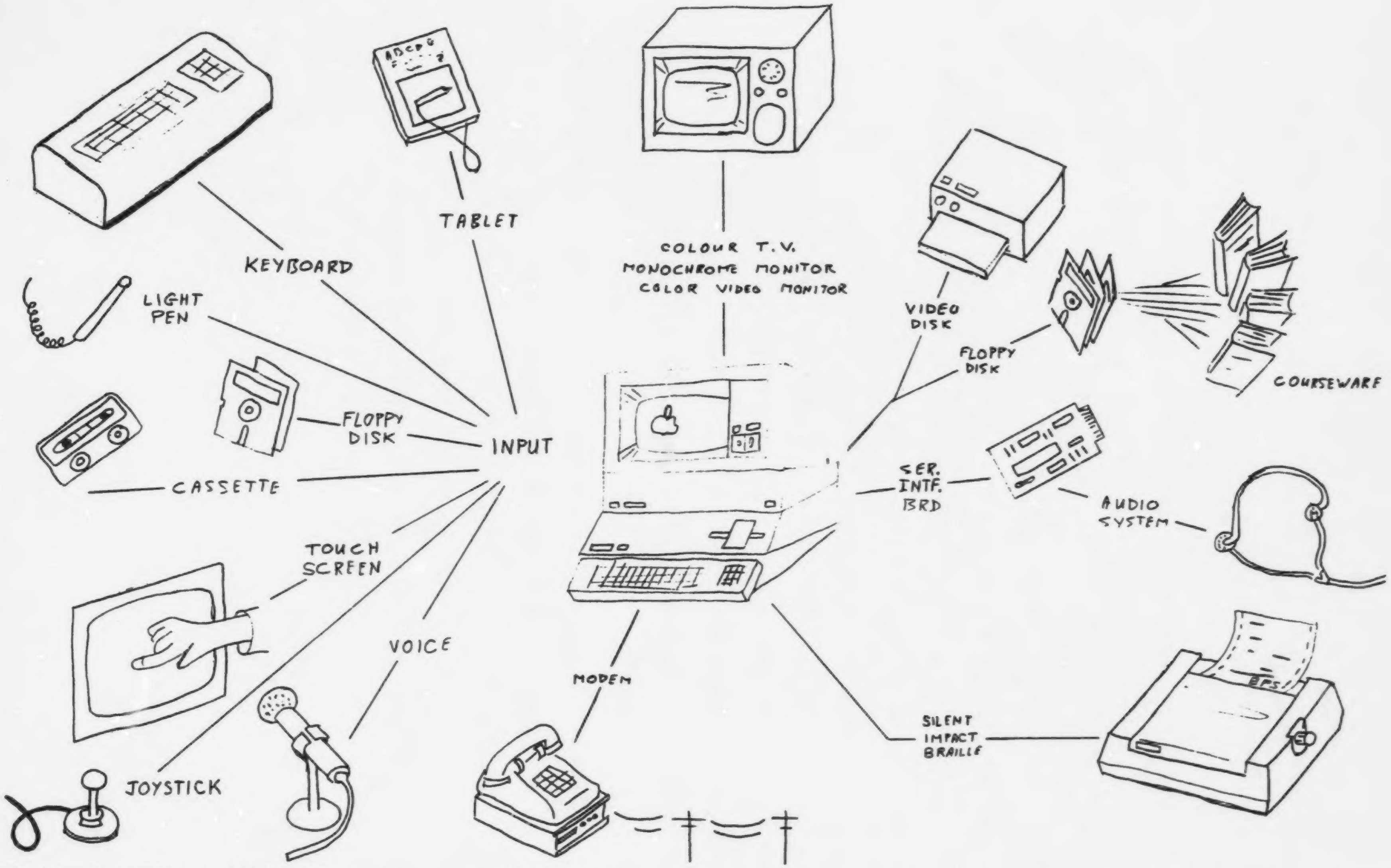
KEYBOARD
TABLET
LIGHT PEN
FLOPPY DISK
INPUT
CASSETTE
TOUCH SCREEN
VOICE
JOYSTICK
COLOUR T.V.
MONOCHROME MONITOR
COLOR VIDEO MONITOR
VIDEO DISK
FLOPPY DISK
COURSEWARE
SER. INTF. BRD
AUDIO SYSTEM
MODEM
SILENT IMPACT BRAILLE

EXHIBIT 6. APPLE II 48K COMPUTER CONFIGURATION

Classification Schemes

There is a hodge-podge of classification schemes that are used to describe or identify courseware in Special Education. Different organizations serving different purposes have developed alternative schemes. The two most popular ones are the computer software approach and the medical handicapping condition approach.

The computer software approach is similar to that used by Trace in its International Hardware/Software Registry. The generic descriptions derive their basis from the terminology and concepts of the electronic and computing industries.

The medical handicapping condition approach attempts to classify the use of microcomputers in special education through labelling the medically diagnosed condition. This is similar to many curriculum approaches and appears to be the basis for the table of contents in the Proceedings of the John Hopkins Personal Computing to Help the Handicapped Contest.

Alternative classification schemes of more or less disaggregate meanings are possible - subject or topic classifications, learning modality systems, and task analysis approaches. However the conceptual model to be followed in sections IV and V of this report is shown opposite Exhibit #7. This scheme is a modified one suggested in the Resource Guide mentioned in the Background part of the report.

Microcomputer Uses In Special Education Model

Exhibit #7

	EDUCATION			REHABILITATION		
	INSTRUCTION		MANAGEMENT		FUNCTIONAL AIDS	
	STUDENT/ CLIENT	TEACHER/ SERVICE PROVIDER	ADMINISTRATIVE	ASSESSMENT/ DIAGNOSTIC	COMMUNICATION	INDEPENDENT LIVING
PHYSICAL DISABILITY	AIDS FOR ACCEPTED COURSEWARE—		ADMINISTRATIVE COURSEWARE		AIDS FOR NON-COMPUTER MATERIALS	ADDITIONAL SOFTWARE
DEVELOPMENTAL DISABILITY	INSTRUCTIONAL COURSEWARE		ADMINISTRATIVE COURSEWARE			

Some software or courseware identified does not clearly fall into the categories shown. These have been collected as additional software. An emerging class of software may be apparent as shown in the following example: Two students may use the microcomputer with one being a regular student and the other a special one in a joint learning session. Additional instructional benefits of this optimized use of the microcomputer is the socialization of peer learning. One such kind of sotware is the Learning Box, a John Hopkin's Contest regional winner.

Microcomputer Aids for Accepted Courseware

Exhibit #8

Input Devices Interface
or
Display Selection Technique

- Direct
  - °Keyboard
  - °Pointers
    - Optical
    - Voice
    - Manual
    - Magnetic
  - °Switches
- Indirect
  - °Scanning
    - Linear
    - Row-Column
    - Directed
  - °Encoding

Output Devices Interface

- Display
  - °Character size
  - °Colour
- Voice
- Sound/Music
- Communication
- Lamp Indication
- Environmental Control
- Printers

IV. AIDS CATALOGUE

In this section of the report aids for using accepted courseware are discussed as well as aids for non-computer curriculum material. The aids for accepted courseware are further classified as alternative sensory devices and special software. The aids for the non-curriculum material consist of alternative communication devices that may be a super-set of alternative sensory devices, and many consist of descriptions of emerging products. As the enumeration of the number of individual devices is beyond the scope of this report only a generic description will be presented.

Aids for Accepted Courseware

Exhibit #6 graphically shows some of the aids currently available as alternative sensory devices. Exhibit #8 opposite gives a listing of these aids in another form.

Microcomputer Aids

In the "Display Selection Technique" list opposite, there are two types of techniques. These were identified and elaborated upon by G. Vanderheiden of the Trace Center. The first technique is "direct" with either the existing keyboard, pointers, or switches being used to immediately respond to the accepted courseware. The second one is "indirect" through either encoding the information (for example a modification to Visicalc such that each template relates to a series of

daily living skills) or scanning a series of letters, symbols, or numbers in alternative searching methods. Feedback to the student as to success in using these display selection techniques may be given visually, audially through musical tones, or kinesthetically through brailler attachments.

"Output devices interface" in Exhibit #8 include variations of the display through character size or colour. Voice output is available with limited vocabulary as is both sound and music/audio output. Communication to remote locations or environmental control devices is available. Further, all manner of light indicators and printing devices are currently in use.

Special Software

In addition to the microcomputer aids for accepted courseware discussed previously special software is available to meet many special education needs. Type-and-say software exists as does type-and-lip-read or type-and-finger-spell. Further, alternative keyboard definitions are available through a software package that interfaces between accepted courseware and the student. This replaces the QWERTY keyboard with the Dvorak or the left handed keyboard.

In many cases software exists that slows the rate of courseware waiting time enabling self-paced student use of accepted courseware.

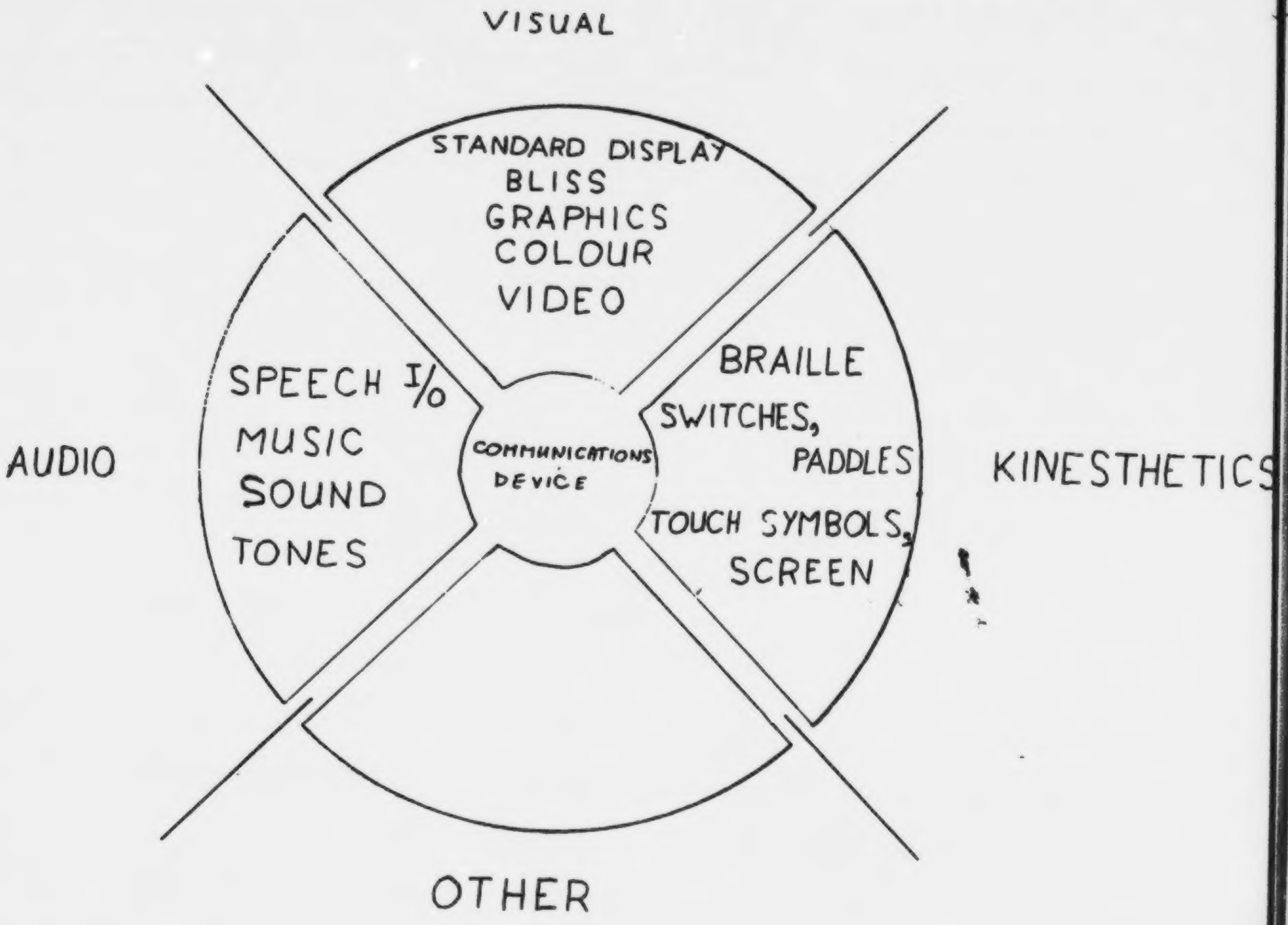
VISUAL
STANDARD DISPLAY
BLISS
GRAPHICS
COLOUR
VIDEO
AUDIO
SPEECH I/O
MUSIC
SOUND
TONES
COMMUNICATIONS DEVICE
KINESTHETICS
BRAILLE
SWITCHES,
PADDLES
TOUCH SYMBOLS,
SCREEN
OTHER

EXHIBIT 9. CONFLUENCE OF TECHNOLOGIES AND MODALITIES

Aids for Non-Computer Curriculum Material

In this part of Section IV aids for non-computer curriculum material are discussed in a generic way. Anumeration of these individual devices is beyond the scope of this report.

Communication Devices

A microcomputer may be used as an aid to non-computer curriculum material, but in this regard it would be called a communication device albeit a very sophisticated one. The Exhibit #9 opposite shows an emerging trend in both education technologies and in learning modalities. That trend is the coming together of technologies through communication devices and the substitution of one learning modality with another through communication devices. An example here would include an Option brailler. This communication device may be used to read textual learning materials and translate characters into Braille and output Braille symbols to a portable carrier. The communication device could also be used to read a microcomputer's display. Hence primary visual information could be produced in a restricted kinesthetic sense. Also video games have used visual and audio input/outputs and now are creating motion or kinesthetic booths to play some games. This would also be an example of the merging or coming together of the learning modalities and technologies. Most alternative sensory devices are communication devices or gate-ways from learning modality or sensual attribute to another.

Speculations about Special Education and the Microcomputer

The availability of aids and devices will continue to proliferate at an even accelerating rate. Physical disability learning problems caused by inappropriate input/output devices will be solved for most accepted courseware and for much non-computer curriculum materials in the near future. The front-end device of the National Research Council could be one such device that offers a wide range of input/output solutions overcoming developmental handicaps in the education of special students may be assisted by some of the work being done in the physically handicapped area; however, the main work needs to be done in lessonware and concept formation using a microcomputer. In summary the availability of hardware and peripherals will continue to become less expensive and greater while the plethora of device types will increase.

The results of increased availability and approaches will result in the impact of microcomputers in special schools being significant. There should be an increase in the availability of the regular general curriculum coupled with an increase in instructional time. The increase in instructional time should result from much of the record keeping, administration, diagnosis, and documentation being assisted with a microcomputer.

Speculations on written courseware are continued in Section V.

A further result of increased communication device use includes the potential to use Telidon type systems and other communication networks. This should result in computerized bulletin board, centralized software registries and maintenance, and a sharing of resources.

V COURSEWARE CATALOGUE

In this section of the report instructional and administrative courseware of direct relevance to special education is identified. Further, vendors who provided preview or complimentary copies of particular courseware have their courseware evaluated on technical consideration. The evaluation process of the Computer Technology Clearinghouse is as extensive or more extensive than the evaluation process of other known evaluation organizations - Sector or Microsift. However, this technical evaluation component only asks if the documentation and courseware are internally consistent and if there is evidence of good use of the microcomputer in a computing science sense.

The software presentation structure is common with the structure of the School Practices Information Network of the BRS/Education Service Group RICE (Resources in Computer Education) database. The bibliographic citation of the courseware listed in the following pages is available on Apple II, DB Master compatable diskettes.

RECORD STRUCTURE KEY

AN	ACCESSION NUMBER
RT	RESOURCE TYPE: AUTHOR, VENDOR
TI	TITLE
PD	AUTHOR (IF KNOWN)
CI	CONTACT INFORMATION
HT	HARDWARE TYPE
SR	SPECIAL REQUIREMENTS
DE	DESCRIPTORS: PACKAGE COMPONENTS, DOCUMENTATION
ID	IDENTIFIERS
AB	ABSTRACT: DESCRIPTION AND TOPICS
EV	EVALUATION
PR	PRICE

EXAMPLE CITATION:

T1: TITLE, maybe blank

PD: Author (if known)

CI: Contact
information for
aquisition

ID: Identification
and Classification
Code

```
TALKING BLISSAPPLE                                   AAAD
        CONTAINS 1400 BLISSYMBOLS        BLISSYMBOLICS COMMUNICATION
        WHICH ALLOWS NON-SPEAKING        350 RUMSEY ROAD
        PEOPLE TO DISPLAY MESSAGES ON    TORONTO, ONTARIO, CANADA
        A MONITOR, PRINTER OR SPOKEN     M4G 1R8
        MANUAL, DISK                     PH. 416-425-7835
                                         APPLE
        SA A A SA SA                     48K, FORTRAN H, SPEECH
                             45.00       SYNTHESIZER
```

PR: Price as currently listed. If "0.00" vendor price is not known.

EV: Technical Evaluation Codes: If there is no entry then not even the technical evaluation has been done.

DE: Package components and documentation.

HT: & SR: Hardware type and special requirements

AB: Abstract and topics

Microcomputer Uses In Special Education Model

Exhibit #7

	EDUCATION			REHABILITATION		
	INSTRUCTION		MANAGEMENT		FUNCTIONAL AIDS	
	STUDENT/ CLIENT	TEACHER/ SERVICE PROVIDER	ADMINISTRATIVE	ASSESSMENT/ DIAGNOSTIC	COMMUNICATION	INDEPENDENT LIVING
PHYSICAL DISABILITY	AIDS FOR ACCEPTED COURSEWARE—		ADMINISTRATIVE COURSEWARE		AIDS FOR NON-COMPUTER MATERIALS	ADDITIONAL SOFTWARE
DEVELOPMENTAL DISABILITY	INSTRUCTIONAL COURSEWARE		ADMINISTRATIVE COURSEWARE			

ID CODES

_ _ _ _ _	
A _ _ _ _	AIDS FOR ACCEPTED COURSEWARE
B _ _ _ _	AIDS FOR NON-COMPUTER CURRICULUM MATERIAL
C _ _ _ _	INSTRUCTIONAL COURSEWARE
D _ _ _ _	ADMINISTRATIVE COURSEWARE
E _ _ _ _	ADDITIONAL SOFTWARE
M _ _ _ _	MULTIPLE USES
_ A _ _ _	PHYSICALLY HANDICAPPED
_ B _ _ _	DEVELOPMENTALLY HANDICAPPED
_ M _ _ _	MULTIPLE USES
_ _ A _ _	STUDENT INSTRUCTION
_ _ B _ _	TEACHER INSTRUCTION
_ _ C _ _	ADMINISTRATIVE MANAGEMENT
_ _ D _ _	DIAGNOSTIC OR ASSESSMENT
_ _ E _ _	COMMUNICATION AIDS
_ _ F _ _	INDEPENDENT LIVING AIDS
_ _ M _ _	MULTIPLE USES
_ _ _ A _	HEARING, SPEECH, LANGUAGE EMPHASIS
_ _ _ B _	LEARNING DISABILITY, DEVELOPMENTAL HANDICAPPED
_ _ _ C _	MOVEMENT, NEURO MUSCULAR, NEUROLOGICAL
_ _ _ D _	VISION
_ _ _ E _	OTHER
_ _ _ M _	MULTIPLE EMPHASIS

EVALUATION CODES

SA	STRONGLY AGREE
A	AGREE
D	DISAGREE
SD	STRONGLY DISAGREE
NA	NOT APPLICABLE
UN	UNABLE TO DETERMINE (IE MISSING HARDWARE) OR

TECHNICAL EVALUATION CODE ORDER

1. SUPPORT MATERIALS ARE BOTH EFFECTIVE & COMPREHENSIVE
2. SCREEN (COLOUR & GRAPHICS) & SOUND USE IS EFFECTIVE
3. USERS CAN EASILY AND/OR INDEPENDENTLY OPERATE PROGRAMS
4. COURSEWARE USES RELEVANT COMPUTER CAPABILITIES
5. COURSEWARE IS RELIABLE UNDER NORMAL AND/OR TESTED USE

A. AIDS COURSEWARE

ALBERTA EDUCATION

COURSEWARE IN SPECIAL EDUCATION

LARGE TYPE SIMPLE, LOW-COST WAY TO TYPEWRITE IN LARGE-PRINT. NORMAL PRINT ALSO POSSIBLE. SOURCE CODE, TAPE 19.95	AAAD NATIONAL INSTITUTE FOR N.I.R.E. - MR. DON SELWYN 97 DECKER ROAD BUTLER, NJ 07405 ANY COMPUTER W/4K RAM & BASIC 4K RAM, BASIC, CASSETTE PLAYER & INTERFACE, VIDEO DISPLAY
TALKING BLISSAPPLE CONTAINS 1400 BLISSYMBOLS WHICH ALLOWS NON-SPEAKING PEOPLE TO DISPLAY MESSAGES ON A MONITOR, PRINTER OR SPOKEN MANUAL, DISK SA A A SA SA 45.00	AAAD BLISSYMBOLICS COMMUNICATION 350 RUMSEY ROAD TORONTO, ONTARIO, CANADA M4G 1R8 PH. 416-425-7835 APPLE 48K, FORTRAN H, SPEECH SYNTHESIZER
TIM COMMUNICATION PROSTHETIC FOR THE NON-VOCAL SEVERELY DISABLED MANUAL, BROCHURE SA A A A SA 0.00	AAAM COMPUTERS FOR THE PHYSICALLY 7602 TALBERT AVENUE SUITES HUNTINGTON BEACH, CALIFORNIA 92647 MFG OWN COMPUTER SOFTWARE INCL 16K, PROPRIATORY BASIC, PADDLES, JOYSTICK, PUFF/SUCK
MORSE CODE CARTRIDGE ALLOWS INPUT OF MORSE CODE BY A SINGLE SWITCH, AND, WHEN INTERFACED WITH VIC-20 AND SYNTHESIZER, SPEAKS THE INPUT SOURCE CODE, DOCUMENTATION BEING DEVELOPED 0.00	AAEA DR. JOHN. B. EULENBERG, ARTIFICIAL LANGUAGE LAB. COMPUTER SCIENCE DEPT. MICHIGAN STATE UNIVERSITY EAST LANSING, MI 48824-1042 COMMODORE MINIMAL MEMORY, BASIC, VOICE SYNTHESIZER AND INTERFACE
MANUAL 0.00	AAEC MICHAEL TROTT WEST MIDLANDS MEP PROJECT FOUR DWELLINGS SCHOOL QUINTON BIRMINGHAM, ENGLAND APPLE, COMMODORE, BBC MICRO B 32K, APPLE-48K, BASIC, QWERTY REPLACEMENT

1. EVALUATIONS WERE DONE BY DSS AND REPRESENT ONLY THE TECHNICAL STEP OF THE TOTAL EVALUATIVE PROCESS.
2. PRICES ARE LISTED FROM VENDORS IN CURRENT DOLLARS AND ARE SUBJECT TO CHANGE.

	0.00	AAEC THE NATIONAL INSTITUTE FOR 97 DECKER ROAD BUTLER, NEW JERSEY 07405 PH. 201-838-2500 RADIO SHACK, COMMODORE BASIC, QWERTY REPLACEMENT, PADDLES, JOYSTICKS, ETC.
ACADEMICS WITH SCANNING-MATH ALLOWS STUDENT TO USE COMPUTER AS WRITING AID. STUDENT USES SWITCHES TO PRODUCE VIDEO AND PAPER OUTPUT FOR MATH PROBLEMS MANUAL, SOURCE CODE, DISK	10.00	AAEC PAUL SCHWEJDA & JUDY MCDONALD COMPUTERS TO HELP PEOPLE, INC. 1221 WEST JOHNSON ST. MADISON, WI 53715 APPLE II+ 48K, APPLESOFT, ONE OR TWO MICROSWITCHES
FLORIDA SCANNER TURNS CERTAIN STANDARD KEYBOARD ENTRY APPLESOFT PGMS INTO PGMS THAT CAN BE OPERATED BY A SINGLE SWITCH MANUAL, SOURCE CODE, DISK	45.00	AAEC RUSHAKOFF AND STEINBERG G. EVAN RUSHAKOFF NEW MEXICO STATE UNIVERSITY LAS CRUCES, NM 88003 APPLE II 32K, APPLESOFT, DOS 3.3, PATCH CORD TO GAME PADLE PORT
HANDI TERM COMMUNICATIONS TOOL, MAY BE USED AS A TERMINAL OR AS A TYPEWRITER BY THE HANDICAPPED USER SOURCE CODE, DISK, SCHEMATICS A A A SA A	0.00	AAEC J. GIEM 1904 WESTFIELD DRIVE FORT COLLINS, COLORADO 80526 PH. 303-223-0844 APPLE 64K, BASIC, 6502 ASSEMBLY LANG SPEC 12 KEY KEYBOARD OR JOYSTK
JOHN'S PROGRAM FOR C/P CHILD WHO IS ABLE TO USE BOTH JOYSTICK AND BUTTONS. CURSOR POINTS TO PGM NAME, PGM SELECTED BY PRESSING BUTTON. DISK	10.00	AAEC HAL GLICKSMAN COMPUTERS TO HELP PEOPLE, INC. 1221 WEST JOHNSON STREET MADISON, WI 53715 APPLE II 48K, BASIC, MINI-PHONE PLUGS ADDED TO JOYSTICK BUTTONS

1. EVALUATIONS WERE DONE BY DSS AND REPRESENT ONLY THE TECHNICAL STEP OF THE TOTAL EVALUATIVE PROCESS.

2. PRICES ARE LISTED FROM VENDORS IN CURRENT DOLLARS AND ARE SUBJECT TO CHANGE.

ALBERTA EDUCATION

COURSEWARE IN SPECIAL EDUCATION

MATH DISK
THE USER MAY USE THE COMPUTER AS A WRITING AID TO DO MATH PROBLEMS

MANUAL, SOURCE CODE, DISK

10.00

AAEC
PAUL SCHWEJDA
COMPUTERS TO HELP PEOPLE, INC.
1221 WEST JOHNSON STREET
MADISON, WI
53715
APPLE II+
48K, APPLESOFT, MICROSWITCHES FOR USE WITH SPECIAL INPUTS

MOTOR TRAINING GAMES
13 DIFFERENT MOTOR TRAINING GAMES, ALLOWS PERSON TO BECOME FAMILIAR WITH USE OF A CONTROL SWITCH IN ENJOYABLE CONTEXT
MANUAL, SOURCE CODE, DISK

10.00

AAEC
PAUL SCHWEJDA & JUDY MCDONALD
COMPUTERS TO HELP PEOPLE, INC.
1221 WEST JOHNSON STRET
MADISON, WI
53715
APPLE II+
48K, APPLESOFT, 1 OR 2 MICROSWITCHES

OPTICALLY ACTUATED KEYBOARD
USES OPTICAL HEAD WAND TO SELECT CHARACTERS TO SPEAK AND SPELL

0.00

AAEC
T. W. CANNON
3345 ALKIRE WAY
GOLDEN, COLORADO 80401

TI

SCANNING PROGRAM
CHANGES APPLESOFT PROGRAMS INTO SCANNING PROGRAMS THAT CAN BE OPERATED BY A SINGLE SWITCH
MANUAL, SOURCE CODE, DISK

87.00

AAEC
FIRST BROWARD DEVELOPMENT
4987 N. UNIVERSITY DRIVE
LAUDERHILL, FL
33321
PH. 305-748-6506
APPLE II
48K, APPLESOFT, EXTERNAL SWITCH CONNECTED TO PADDLEBD

TALK TYPER
A WORD PROCESSING PRGRAM THAT IS OPERATED BY VOICE CONTROL

MANUAL, DISK

0.00

AAEC
ROBERT SACK AND G. EVAN
G. E. RUSHAKOFF
NEW MEXICO STATE UNIVERSITY
LAS CRUCES, NM
88003
APPLE II
48K, APPLESOFT, HEURISTICS SPEECHLINK FOR THE APPLE

1. EVALUATIONS WERE DONE BY DSS AND REPRESENT ONLY THE TECHNICAL STEP OF THE TOTAL EVALUATIVE PROCESS.
2. PRICES ARE LISTED FROM VENDORS IN CURRENT DOLLARS AND ARE SUBJECT TO CHANGE.

TEXTTALKER

TURNS AN ORDINARY APPLE II COMPUTER INTO A FULL-FUNCTION TALKING COMPUTER.

MANUAL, DISK

24.95

AAEC
PROF. P. MAGGS & MS. D. VISEK
STREET ELECTRONICS CORP.
3152 E. LA PALMA AVE., SUITE D
ANAHEIM, CA
92806
APPLE II
48K, ASSEMBLER, ECHO II VOICE SYNTHESIZER, 1 DISK DRIVE

AAED
RAISED DOT COMPUTING
310 S. 7TH STREET
LEWISBURG, PA
17837
PH. 717-523-6739
APPLE
48K, BASIC, VOICE OUT, PRINTER VERSABRAILLE OR BRAILLE EMBOSS

0.00

BLIND PROGRAMMING UTILITY

PROGRAM THAT READS CONTENTS OF SCREEN TO OPERATOR. MAY BE USED TO TYPE AND SPEAK KEYBOARD INPUT

0.00

AAED
J.S. SCHAEFER
DR. P. HAZAN
JOHNS HOPKINS UNIVERSITY
BALTIMORE, MARYLAND

TRS-80
VOICE SYN.

BRAILLE

ALLOWS UNTRAINED OPERATORS TO INPUT TEXT AT A TERMINAL FOR TRANSLATION INTO BRAILLE.

DISK, TAPE

0.00

AAED
RANDY W. DIPNER
TETRAHEDRON RESEARCH ASSOC.
3425 VALEJO CT.
COLORADO SPRINGS, CO
80918
ANY COMPUTER
4K, BASIC, DAISY-WHEEL PRINTER

ELECTRONIC BLACKBOARD

INTENDED FOR USE BY BLIND PERSONS WHO NEED TO PRESENT MATERIAL TO A SIGHTED AUDIENCE

MANUAL, DISK

400.00

AAED
DAVID HOLLADAY
RAISED DOT COMPUTING
310 S. SEVENTH STREET
LEWISBURG, PA
17837
APPLE II+
48K, DOS 3.3, 1 DISK DRIVE, TV MONITOR

1. EVALUATIONS WERE DONE BY DSS AND REPRESENT ONLY THE TECHNICAL STEP OF THE TOTAL EVALUATIVE PROCESS.
2. PRICES ARE LISTED FROM VENDORS IN CURRENT DOLLARS AND ARE SUBJECT TO CHANGE.

ALBERTA EDUCATION

COURSEWARE IN SPECIAL EDUCATION

MUSICAL LANG. TERMINAL FOR THEVISUALLY IMPAIRED AAED

SERIES OF PROGRAMS THAT TEACH A TONAL LANGUAGE. SOME PROGRAM SOUND OUT COMPUTER AND LEARNER RESPONSES TO SCREEN CONTENTS

0.00

CENTER FOR REHABILITATION
GEORGIA INSTITUTE OF TECH.
ATLANTA, GEORGIA 30332

APPLE
ALF MUSIC SYNTHESIZER BOARD

TOTAL TALK COMPUTER TERMINAL AAED

MICROCOMPUTER BASED HARDWARE THAT CONVERTS COMPUTER DATA INTO FULL WORD SYN. SPEECH. HAS WIDE INSTALLED BASE

0.00

D.B.BLAZIE
MARYLAND COMPUTER SERVICES INC
FOREST HILL, MARYLAND 21050

AUTOTYPE I AAEM

ENABLES THE TRS80 TO BE USED IN A SIMILAR WAY TO THE POSSUM MACHINE

0.00

J. M. LEONARD
M.D.T.S. LIB.
EDUCATION DEVELOPMENT CENTRE
36 WOLVERHAMPTON ROAD
WALSALL
TRS80 LII
16K, PRINTER

QUIK-TALK AAEM

USES AN INEXPENSIVE SPEECH SYNTHESIZER AND A SPECIAL PROGRAM TO ADD VOICE OUTPUT TO A PERSONAL COMPUTER

695.00

COMPUTER SYSTEM RESOURCES, INC
3222 S. W. 35TH BOULEVARD
GAINESVILLE, FL
32608
PH. 904-376-4276
APPLE
48K, BASIC

VISIBLE SPEECH AID AAMA

GIVES SIMPLE GRAPHICS OF VOICE PITCH, LOUDNESS AND RHYTHM TO ASSIST IN VOCAL TRAINING WITH HEARING OR VOCAL HANDICAPS
MANUAL, DISK, BACK-UP

SA SA SA SA SA

675.00

JEM RESEARCH
SOFTWARE RESEARCH CORPORATION
DISCOVERY PARK
UNIVERSITY OF VICTORIA
POB 1700
APPLE
48K, BASIC, A/D INTERFACE CARD PROVIDED WITH THE PACKAGE

1. EVALUATIONS WERE DONE BY DSS AND REPRESENT ONLY THE TECHNICAL STEP OF THE TOTAL EVALUATIVE PROCESS.
2. PRICES ARE LISTED FROM VENDORS IN CURRENT DOLLARS AND ARE SUBJECT TO CHANGE.

SINGLE SWITCH ASSESSMENT PROGRAM	PROVIDES THE CLINICIAN WITH TIME DATA ON WHICH MODEL OF SINGLE SWITCH AND WHICH PLACEMENT BEST SUITS AN INDIV. MANUAL, SOURCE CODE, DISK	40.00	AMDM	RUSHAKOFF AND HANSEN G. E. RUSHAKOFF NEW MEXICO STATE UNIVERSITY LAS CRUCES, NM 88003 APPLE II 32K, APPLESOFT, PATCH CORD TO PADDLE PORT
EIGHTYTALKER	CONVERTS ANY MICROCOMPUTER USING AN 8080, Z80 OR 8085 MICROPROCESSOR AND CP/M INTO A FULL FUNCTION TALKING COMPUTER MANUAL, SOURCE CODE	8.00	AMEE	PETER B. MAGGS CP/M USERS GROUP 1651 THIRD AVENUE NEW YORK, NY 10028 ANY CP/M O.S. 64K, ASSEMBLER, CP/M, VOTRAX TYPE-N-TALK OR ECHO II GP SYN.
HANDI-KEYS(C)	HELPS DESIGN A KEYBOARD THAT SUITS AN INDIVIDUAL'S NEEDS MANUAL, DISK	50.00	AMEM	RONALD S. MCCUISTON 5795 ADELYN ROAD PENSACOLA, FL 32504 TRS-80 MODEL II 64K, ASSEMBLER & COMPILED BASIC, TRS DOS 2.0A OR 2.0
HANDI-KEYS PERSONALIZED KEYBRD	TWO BASIC PROGRAMS ALLOW REDEFINING QWERTY KEYBOARD INTO ONE THAT USERS NEED	0.00	AMMM	R.S.MCCUISTON DEPT. OF MATHEMATICS PENSACOLA JUNIOR COLLEGE PENSACOLA, FLORIDA
ONE SWITCH INPUT SUBROUTINE	ALLOWS EXISTING SOFTWARE TO RUN UNMODIFIED.	0.00	AMMM	M.A. CHASE DR. P HAZAN JOHNS HOPKINS UNIVERSITY BALTIMORE, MARYLAND TRS-80

1. EVALUATIONS WERE DONE BY DSS AND REPRESENT ONLY THE TECHNICAL STEP OF THE TOTAL EVALUATIVE PROCESS.
2. PRICES ARE LISTED FROM VENDORS IN CURRENT DOLLARS AND ARE SUBJECT TO CHANGE.

SIMON

THE ELECTRONIC GAME "SIMON"
HAS BEEN ADAPTED FOR USE BY
THE VISUALLY IMPAIRED

BAAD

BILL JAMES
5903 DANNY KAYE
BOX 3207
SAN ANTONIO, TX 78240
PH. 512-696-8750

0.00

ANGLOPHONE

SOFTWARE + SPEECH SYNTHESIZER
TURNS COMPUTER INTO A FULL
FUNCTION TALKING COMPUTER FOR
BLIND OR SPEECH IMPAIRED USERS
MANUAL, DISK

BAAM

PETER B. MAGGS
2011 SILVER COURT EAST
URBANA, ILLINOIS
61801
PH. 217-333-6711
APPLE, ANY COMPUTER WITH CP/M
48 OR 64K, BASIC, SPEECH
SYNTHESIZER

40.00

COUNTER

1-5 PICTURES DISPLAYED WITH
NUMBERS. SQUARE MOVES THROUGH
NUMBERS. SWITCH PRESSED AT
DESIRED NUMBER.

BAAM

T. J. KITCHEN
M.D.T.S. LIB.
EDUCATION DEVELOPMENT CENTRE
36 WOLVERHAMPTON ROAD
WALSALL
TRS80 LII
16K, ANY SWITCHES VIA
INTERFACE

0.00

MICRO COMMUNICATOR

A SINGLE KEYSTROKE BY FINGER
OR MOUTHSTICK WILL DISPLAY ANY
SENTENCE CHOSEN FROM 60 OR
MORE PROGRAMMED SENTENCES
MANUAL, SOURCE CODE, DISK

BAEA

GRANT GROVER
GROVER AND ASSOCIATES
7 MT. LASSEN DR. D116
SAN RAFAEL, CA
94903
APPLE II OR II+
48K, APPLESOFT, DOS. 3.2.1.,
DISK DRIVE

48.00

SCOT

ALLOWS TEACHER TO CREATE
VOCABULARIES FOR THE PANEL
AND LETS THE STUDENT TOUCH THE
SQUARES TO COMMUNICATE
SOURCE CODE, DISK,
DOCUMENTATION BEING DEVELOPED

BAEA

DR. JOHN B. EULENBERG,
ARTIFICIAL LANGUAGE LAB.
COMPUTER SCIENCE DEPT.
MICHIGAN STATE UNIVERSITY
EAST LANSING, MI 48824-1042
APPLE
MINIMAL MEMORY, BASIC, VOICE
SYNTHESIZER AND TOUCH PANEL

10.00

1. EVALUATIONS WERE DONE BY DSS AND REPRESENT ONLY THE TECHNICAL STEP OF THE TOTAL EVALUATIVE PROCESS.
2. PRICES ARE LISTED FROM VENDORS IN CURRENT DOLLARS AND ARE SUBJECT TO CHANGE.

SPEAKING COMM/CONTROL DEVICE
COMPUTER BECOMES A SPEECH OR
PRINTING OUTPUT COMM. DEVICE
FOR NON-VERBAL, MOTOR-
HANDICAPPED INDIVIDUAL
MANUAL, TAPE

225.00

BAEA
JOSEPH T. COHN, M.D.
I.O.R. ENTERPRISES
RT. 6, BOX 20
CHAPEL HILL, NC
27514
TRS-80 MODEL I, PMC-80
16K, BASIC, SPEECH SYNTHESIZER
PLUG-N-POWER MODULE

TALK II
TURNS THE APPLE II+ INTO A
HIGHLY VERSATILE AND FLEXIBLE
SPEECH OUTPUT SYSTEM FOR NON-
VERBAL COMMUNICATION
MANUAL, SOURCE CODE, DISK

90.00

BAEA
RUSHAKOFF, CONDON AND LEE
G. EVAN RUSHAKOFF
NEW MEXICO STATE UNIVERSITY
LAS CRUCES, NM
88003
APPLE II+
48K, APPLESOFT, ECHO II SPEECH
SYNTHESIZER, DISK DRIVE

TALKING BLISSAPPLE
ALLOWS INDIVIDUALS WHO USE
BLISSYMBOLICS TO HAVE A MEANS
OF WRITING.

MANUAL, DISK

35.00

BAEA
TRACE R & D CENTER
COMPUTERS TO HELP PEOPLE, INC.
1221 WEST JOHNSON STREET
MADISON, WI
53715
APPLE II
48K, 1 DISK DRIVE AND MONITOR

WORDS+
PROVIDES NON-ORAL COMM. AND
OTHER FEATURES FOR THE
SEVERELY HANDICAPPED. SINGLE
SWITCH W/SCAN OR 2-SWITCH OP.
DISK, MANUAL

75.00

BAEA
WALT WOLTOSZ
655 S. FAIR OAKS, M213
SUNNYVALE, CA
94086
PH. 408-733-6358
TRS-80, APPLE, OTHER
48K, BASIC, CUSTOM SWITCH TO
PARELLEL SPACE BAR, '@' KEY

ACADEMICS WITH SCANNING - LANGUAGE ARTS
FOR STUDENTS UNABLE TO USE
PENCIL AND PAPER TO DO
SCHOOLWORK.

MANUAL, SOURCE CODE, DISK

10.00

BAEC
PAUL SCHWEJDA
COMPUTERS TO HELP PEOPLE, INC.
1221 WEST JOHNSON STREET
MADISON, WI
53715
APPLE II+
48K, APPLESOFT, TWO SWITCHES

1. EVALUATIONS WERE DONE BY DSS AND REPRESENT ONLY THE TECHNICAL STEP OF THE TOTAL EVALUATIVE PROCESS.
2. PRICES ARE LISTED FROM VENDORS IN CURRENT DOLLARS AND ARE SUBJECT TO CHANGE.

ALBERTA EDUCATION

COURSEWARE IN SPECIAL EDUCATION

AUTOTYPE II	THE PROGRAM ENABLES THE PUPIL TO USE THE COMPUTER AS AN ELECTRIC TYPEWRITER, WITH A SINGLE SWITCH INPUT	0.00	J. M. LEONARD M.D.T.S. LIB. EDUCATION DEVELOPMENT CENTRE 36 WOLVERHAMPTON ROAD WALSALL TRS80 LII 32K, OPTIONAL PRINTER OR SWITCH	BAEC
C.U.R.T.I.S.	TEACHES THE PROFOUNDLY MOTOR-HANDICAPPED, NON-VERBAL PERSON HOW TO USE ROW/COLUMN SCANNING TO COMMUNICATE TAPE	0.00	JOSEPH T. COHN, M.D. I.O.R. ENTERPRISES RT. 6, BOX 20 CHAPEL HILL, NC PH. 919-929-4825 TRS-80 (MOD I OR III), PMC-80 16K, BASIC, SIMPLE HARDWARE MOD. IS RECOMMENDED	BAEC
COMMUNI-MATE	ALLOWS INDIVIDUALS TO GENERATE HIGH QUALITY, ERROR FREE TEXT IN QUANTITY SUFFICIENT TO CONDUCT PERSONAL BUSINESS, ETC MANUAL, SOURCE CODE, DISK, TAPE	100.00	DR. JAMES H. HERZOG GREEN VALLEY INFORMANTICS 769 N. SACRE LANE MONMOUTH, OR 97361 PET OR CBM 8K, BASIC	
COMPUTER COMMUNICATION ASSISTOR	ANY CONTROLLED MOVEMENT, WHICH CAN ACTUATE A SWITCH, ENABLES THE COMMUNICABLY HANDICAPPED TO HAVE THOUGHTS PRINTED, ETC. MANUAL, DISK OFFERED AS A PROTOTYPE FOR	0.00	KENDALL PAUL CROOKSTON SOFTWARE DISTRIBUTOR ANN SELF SCHOOL 618 N. ASPEN CIRCLE PRICE, UT APPLE II+ 48K, APPLESOFT, PRINTER, DISK DRIVE, MTN. H/WARE SUPERTALKER	BAEC
HANDI-WRITER	SOURCE CODE, MANUAL, BROCHURE D A A A A	16.95	HOWARD F. BATIE 12002 CHEVIOT DRIVE HERNDON, VIRGINIA 22070 PH. 703-437-3847 RADIO SHACK COLOR, 32K, EXTENDED COLOR BASIC	BAEC

1. EVALUATIONS WERE DONE BY DSS AND REPRESENT ONLY THE TECHNICAL STEP OF THE TOTAL EVALUATIVE PROCESS.
2. PRICES ARE LISTED FROM VENDORS IN CURRENT DOLLARS AND ARE SUBJECT TO CHANGE.

HANDICAPPED TYPEWRITER ALLOWS COMPUTER PLUS PRINTER TO BECOME A DEDICATED TYPEWRITER CONTROLLED BY A SINGLE SWITCH MANUAL, SOURCE CODE, DISK SA SA A SA SA	200.00	BAEC BILL SMITH ROCKY MOUNTAIN SOFTWARE INC. 214-131 WATER STREET VANCOUVER, B.C., CANADA V6B 4M3 APPLE II+ 48K, APPLESOFT & ASSEMBLER, SILENTYPE PRINTER, ETC.
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ELEMENTS OF MUSIC
FOR INDIVIDUALS INTERESTED IN TEACHING MUSIC FUNDAMENTALS USING COMPUTERS

MANUAL, BROCHURE

99.95

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ELECTRONIC COURSEWARE SYSTEMS
POB 2374, STATION A
CHAMPAIGN, ILLINOIS
61820
PH. 217-359-7099
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MATH LAB
CONTAINS THREE DISKS: TIME-RATE-DISTANCE, GRAPHS, AND SIX PUZZLES

DISK

0.00

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EDU TECH
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NEWTON CENTER, M. A.
02159

APPLE
48K, BASIC, PADDLES

1. EVALUATIONS WERE DONE BY DSS AND REPRESENT ONLY THE TECHNICAL STEP OF THE TOTAL EVALUATIVE PROCESS.
2. PRICES ARE LISTED FROM VENDORS IN CURRENT DOLLARS AND ARE SUBJECT TO CHANGE.

MONEY
CAAM

AMOUNTS INPUT AND USING THE
KEYBOARD ANY AMOUNT FROM 1P TO
10 POUNDS CAN BE SELECTED TO
GIVE TOTAL

0.00

T. J. KITCHEN
M.D.T.S. LIB.
EDUCATION DEVELOPMENT CENTRE
36 WOLVERHAMPTON ROAD
WALSALL
TRS80 LII
16K, OPTIONAL USE OF PRIMARY
KEYBOARD

EDIT 1 & 2, GAMES 1 & 2
CAEA

COMMUNICATION BY NON-VOCAL
INDIVIDUALS, GAMES UTILIZING
LOGICAL DEDUCTION, SPELLING,
ARITHMETIC CAPABILITIES, ETC.
MANUAL, CARTRIDGE (PROM)

250.00

ANDRE BONDERMAN
EDUCATIONAL MICROCOMPUTER
SYSTEMS
1 CLEAR SPRING
IRVINE, CA
SORCERER (MANF. BY EXIDY)
8K, Z-80 ASSEMBLY, MONITOR,
INTERFACE, MINOR H/WARE MOD.

COMPUTER FINGERSPELLING
CAMA

AIDS DEVELOPMENT OF FINGER
SPELLING SKILLS OF THE DEAF.
HAND MOTION IS DISPLAYED ON
THE SCREEN

0.00

K.C.KIHNEMAN AND R.M.SALATHIEL
INSTITUTE FOR CAI OF SIGN LANG
5909 W. LOOP S. SUITE 555
BELLAIRE, TEXAS 77401
PH. 713-667-2363
RADIO SHACK

DEAFSIGN (C)
CAMA

TEACHES FINGER SPELLING BY
MEANS OF VIDEO-GRAPHICS
ACCOMPANIED BY EXPLANATORY
TEXT
MANUAL, TAPE, DISK

69.95

DANIEL K. JOHNSTON
ADVANCED COMPUTER SERVICES
DANIEL K. JOHNSTON
14 LYNNE LANE
FROSTPROOF, FL
TRS-80 MOD III
16K, BASIC

FINGERSPELLING
CAMA

SA SA A A SA

70.00

D. GARTON
ATARI PROGRAM EXCHANGE
POB 3705
SANTA CLARA, CA
95055
ATARI

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FINGERSPELLING USING A PET
CAMA
GRAPHICS DISPLAY PROGRAM FOR PRACTICE READING FINGERSPELL

D.N. BOYER
46 SYCAMORE STREET
ROCHESTER, N.Y. 14620

COMMODORE

0.00

LIP-READER TRAINER: A PROGRAM FOR THE HEARING IMPAIRED
CAMA
SOFTWARE THAT CONVERTS TYPED SENTENCES INTO ANIMATED MOUTH MOVEMENTS

ROBIN L. HIGHT
UNIVERSE ELECTRIC RESEARCH CO.
339 INNISFAIL DRIVE
ST.LOUIS, MISSOURI 63119

APPLE 11

0.00

VISUAL COMPUTER AUGMENTED TEACHING SYSTEM
CAMM
AUTHORING AND INSTRUCTING SYSTEM COMBINING FINGER SPELLING FEATURES WITH A SPEECH SYNTHESIZER

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1602 NOBLE FOREST DR.
ATLANTA, GA. 30092
404-448-1523

INTEL SYSTEMS CORP. 3650

0.00

EDUFUN
CBAB
ENCOURAGES LEARNING DISABLED TO IMPROVE MATH SKILLS, IMPROVE SPELLING, AND TO INCREASE READING SPEED
MANUAL, SOURCE CODE, DISK OR TAPE

JOSEPH L. TERPENNING
25 ROSE HILL PARK
CORNWALL, NY
12518
PH. 914-534-3339
TRS-80 MODEL I/III
32K, BASIC, CASSETTE PLAYER OR DISK DRIVE, DOS

10.00

MULTISENSORY PROGRAM FOR DYSLEXIC STUDENTS
CBAB
STUDENT TRACES WORDS ON A CRT USING A LIGHT PEN AS A VOICE SYNTHESIZER SOUNDS OUT WORDS

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MANALAPAN EDUCATIONAL CENTER
MANALAPAN, NEW JERSEY

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0.00

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PRIMER 81

PROGRESSIVE USER-ORIENTED COMPUTER GRAPHICS PROGRAMS FOR DYSLEXIA AND RELATED DISORDERS

MANUAL, SOURCE CODE, DISK

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BROOKTONDALE, NY
14817

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0.00

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SERIES OF PROGRAMS THAT ID AND TREAT BRAIN INJURY. INCLUDES ADM SUPPORT LOG OF RESPONSES

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LIFE SCIENCE ASSOCIATES
BAYPORT, NEW YORK 11705

TRS-80, APPLE

0.00

THE MATH MACHINE

MULTI-LEVEL MATH FROM PRE-SCHOOL TO K-6

EXTENSIVE USE OF MICRO

A A A SA A

CBAB

M. W. WATKINS
SOTHWEST EDPSYCH
SERVICES INC.
POB 1870
PHOENIX, AZ 85001
APPLE

100.00

THE WORLD OF COUNTING

PROGRAM DEVELOPED ESPECIALLY FOR THE TRAINING OF LEARNING DISABLED STUDENTS

MANUAL, DISK

CBAB

EDUCOMP ENTERPRISES, DEPT. 110
191 NORTH 650 EAST
BOUNTIFUL, UT
84010

APPLE II+
32K, APPLE PILOT, MONITOR

24.95

BIKE STORY

CHILDREN ENTER NAMES, PLACES, ETC., INTO THE COMPUTER. THEN A BIKE SAFETY STORY UNFOLDS.

CASSETTE, DISK

CBAM

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PH. 1-800-232-2224
PET, TRS-80

24.95

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CBAM

PROVIDES DRILL IN 20 OF THE MOST FREQUENTLY ASKED QUESTIONS ON THE ROAD RULES TEST

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75647

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32K, BASIC

A A A A A

49.95

DRIVE TO LIVE
CBFB

THIS PROGRAM ASSISTS EMR AND LD STUDENTS TO OBTAIN THEIR DRIVERS LICENSE

M.BLESSING
DEPT. OF SPECIAL EDUCATION
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GLADEWATER, TEXAS

APPLE

A A A A A

0.00

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1302 SOUTH GENERAL MCMULLEN
SAN ANTONIO, TEXAS
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APPLE, RADIO SHACK
32K, BASIC

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HANDICAPPED WORD GAMES
CMAC

SPECIALLY ROGRAMMED "HANGMAN" AND "SCRAMBLE" FOR CHILDREN WHO CANNOT ACCURATELY TYPE

DISK, CASSETTE

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QUEUE, INC.
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PH. 1-800-232-2224
PET, TRS80

25.00

CMAE

LESSONS IN ALGEBRA

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SAN ANTONIO, TEXAS
78237
PH. 512-434-3681
APPLE, RADIO SHACK
48K, BASIC

0.00

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ANIMATED COLOR GRAPHICS AND SYNTHESIZED SPEECH PROGRAMMED TO TEACH BASIC COUNTING, ARITH AND WORD RECOGNITION
SOURCE CODE, MANUAL, DISK, TAPE, BACK-UP
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UPPER ROOM MICROCOMPUTER
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MENOMONIE, WISCONSIN
54751
PH. 715-235-5775
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16K, BASIC, JOYSTK, COLOR GRAPHICS, SPEECH SYNTH & EDIT

TUTORIAL WITH DRILL AND PRACTICE
MANUAL
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STERLING SOFTWARE
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AUSTIN, TEXAS
78744
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BASIC

1 2 3 DIGIT MULTIPLICATION
MULTIPLY A 3 DIGIT NUMBER BY A 1, 2, OR 3 DIGIT NUMBER
DISK, CASSETTE
25.00

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MICROCOMPUTER WORKSHOPS
QUEUE, INC.
5 CHAPEL HILL DRIVE
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APPLE, TRS-80, PET, ATARI

2ES COURSEWARE
PACKAGES FOR ALL COURSES IN ALL GRADES
29.95

CMAM
MARY CAROL SMITH
AVANT-GARDE CREATIONS
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EUGENE, OR
97403
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A COMPUTER IS: - TERMS, DEVICES, SHAPES AND SIZES
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12820 HILLCREST RD., STE. 224
DALLAS, TX
75230
PH. 214-239-6620
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ADDITION CMAM
FOUR DISK PACKAGE WITH PRETEST
DISK
AQUARIUS
QUEUE, INC.
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APPLE, TRS-80

115.00

ADDITION AND SUBTRACTION OF WHOLE NUMBERS CMAM
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ORANGE CHERRY MEDIA
QUEUE, INC.
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PH. 1-800-232-2224
APPLE, PET, TRS-80

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ADDITION WITH CARRY CMAM
STEP BY STEP APPROACH
CASSETTE, DISK
MICROCOMPUTER WORKSHOPS
QUEUE, INC.
5 CHAPEL HILL DRIVE
FAIRFIELD, CT 06432
PH. 1-800-232-2224
APPLE, TRS-80, PET, ATARI

20.00

ADVENTURES AROUND THE WORLD CMAM
FOUR PROGRAMS STORIES DESIGNED TO HELP STUDENTS GRADES 3-6 DEVELOP THEIR READING SKILLS
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ORANGE CHERRY MEDIA
QUEUE, INC.
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PH. 1-800-232-2224
APPLE, PET, TRS-80

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ADVERTISING TECHNIQUES; PERSUASION WITH WORDS CMAM
DESCRIBES FOUR TECHNIQUES: JOIN THE CROWD, DECIDE FOR YOURSELF, REMEMBER ME?, AND ACT NOW!
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ACADEMIC SOFTWARE
K-12 MICROMEDIA
QUEUE, INC.

APPLE II
32K, APPLESOFT IN ROM

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ALMANAC - THE TIME MACHINE (CALENDAR & ASTRONOMY)

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WILLIAM R. PARKS
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FREDONIA, NY
14063
PH. 716-679-1434
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32K, BASIC & ASSEMBLER

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ALPHABET SQUARES

LEARN THE ABC'S. MATCH 26 COLOR PICTURES WITH LARGE ALPHABET LETTERS

DISK

CMAM

VERSA COMPUTING
QUEUE, INC.
5 CHAPEL HILL DRIVE
FAIRFIELD, CT 06432
PH. 1-800-232-2224
APPLE

29.95

ALPHABET/KEYBOARD

TEACHES POSITION OF KEYS, GRADES K-1

CMAM

RANDOM HOUSE - SCHOOL DIVISION
2970 BRANDY WINE ROAD
ATLANTA, GA
30341
PH. 800-638-6460
APPLE II
32K

53.00

ALPHAKEY

TEACHES KINDERGARTEN AND FIRST GRADERS THE LOCATION OF LETTER KEY ON THE KEYBOARD, AND TO TYPE THEM IN ALPHABETICAL ORD.
CASSETTE OR DISK

CMAM

BERTAMAX
QUEUE, INC.
5 CHAPEL HILL DRIVE
FAIRFIELD, CT 06432
PH. 1-800-232-2224
TRS80, APPLE II

29.80

APPLE DIALOG - KEYBOARD TUTOR

CMAM

INDIAN HEAD SOFTWARE
1002 INDIAN HEAD DRIVE
SNOW HILL, NC
28580
PH. 919-747-2839
APPLE II+
8K, APPLESOFT BASIC

12.00

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ALBERTA EDUCATION

COURSEWARE IN SPECIAL EDUCATION

ASIGNMENT SET CMAM

COLLECTION OF QUESTIONS & PROG. EXERCISES

INDIAN HEAD SOFTWARE
1002 INDIAN HEAD DRIVE
SNOW HILL, NC
28580
PH. 919-747-2839
APPLE II+
8K, APPLESOFT BASIC

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AUTOPICT I CMAM

RECOGNITION OF PICTURE OBJECT AND ASSOCIATION WITH SPOKEN OR WRITTEN DESCRIPTION

J. M. LEONARD
M.D.T.S. LIB.
EDUCATION DEVELOPMENT CENTRE
36 WOLVERHAMPTON ROAD
WALSALL
TRS80 LII
32K, SUITABLE SWITCH VIA INTERFACE

0.00

AUTOPICT II CMAM

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J. M. LEONARD
M.D.T.S. LIB.
EDUCATION DEVELOPMENT CENTRE
36 WOLVERHAMPTON ROAD
WALSALL
TRS80 LII
16K

0.00

BALLOON BANDIT CMAM

ADDITION, SUBTRACTION, MULTIPLICATION OR DIVISION PROBLEMS

CASSETTE, DISK, TEACHER'S GUIDE

ORANGE CHERRY MEDIA
QUEUE, INC.
5 CHAPEL HILL DRIVE
FAIRFIELD, CT 06432
PH. 1-800-232-2224
ATARI

50.00

BASIC ARITHMETIC CMAM

SIX GAMES AND DRILLS DEVELOP SKILLS IN MULTIPLICATION, ETC.

EXTENSIVE DOCUMENTATION, DISK

SUNBURST (PRODUCED BY MECC)
QUEUE, INC.
5 CHAPEL HILL DRIVE
FAIRFIELD, CT 06432
PH. 1-800-232-2224
ATARI

30.00

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BEGINNING MATH CONCEPTS

GRADES K-2. FOUR PROGRAMS ON
COUNTING, NUMBERS, PLUS ONE.

CASSETTE, DISK

CMAM

ORANGE CHERRY MEDIA
QUEUE, INC.
5 CHAPEL HILL DRIVE
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PH. 1-800-232-2224
APPLE, PET, TRS-80

67.00

BEGINNING READING PACKAGE

6 PROGRAMS ON ALPHABET SONG,
ALPHABLOCKS, BEGINNING AND
ENDING SOUNDS, WHICH TWO ARE
THE SAME, ALPHABETICAL ORDER
DISK, CASSETTE

CMAM

MICROGRAMS
QUEUE, INC.
5 CHAPEL HILL DRIVE
FAIRFIELD, CT 06432
PH. 1-80-232-2224
PET
16K

59.95

CALENDAR

PRACTICE IN LEARNING CALENDAR
SKILLS

CASSETTE

CMAM

JMH
QUEUE, INC.
5 CHAPEL HILL DRIVE
FAIRFIELD, CT 06432
PH. 1-800-232-2224
VIC-20, PET, ATARI

20.00

CALENDAR SKILLS

DRILLS STUDENT ON DAYS OF WEEK
AND MONTHS OF YEAR, AS WELL AS
ON SEASONS AND HOLIDAYS

GRADE 2-5

CMAM

HARTLEY COURSEWARE, INC.
ACADEMIC SOFTWARE
OPPORTUNITIES FOR LEARNING,INC
QUEUE, INC.

APPLE II
48K, APPLESOFT IN ROM, DOS 3.2
OR 3.3

29.95

CHANGE MAKING

GIVES STUDENTS PRACTICE IN
MAKING CORRECT CHANGE

CASSETTE OR DISKETTE
SOURCE CODE

CMAM

ROBERT R. BAKER, JR.

TRS80 MOD I OR III
16K, BASIC

29.85

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CHILDREN'S CAROUSEL
CMAM
NINE MENU SELECTED GAMES WITH COLOR AND SOUND INCLUDING MATCHING SHAPES, COUNTING, LETTER RECOGNITION AND MORE
DISK

D A A A A
19.95

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QUEUE, INC.
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FAIRFIELD, CT 06432
PH. 1-800-232-2224
APPLE

CLOCK
CMAM
HELPS STUDENT LEARN TO TELL TIME

DISK
GRADE 1-5
39.95

HARTLEY COURSEWARE, INC.
ACADEMIC SOFTWARE
SCHOLASTIC SOFTWARE

APPLE II
48K, APPLESOFT

CLOCK
CMAM
PRESENTS PROBLEMS IN TELLING TIME BY THE HOUR AND HALF-HOUR

CASSETTE OR DISK
PRIMARY
10.00

MICRO-ED, INC.
TEXAS INSTRUMENTS

COMMODORE 64, PET, TI99/4

COLOR GUESS
CMAM
TEACHES THE READING AND SPELLING OF COLOR WORDS BY ASSOCIATING THE COLOR WITH THE CORRECT COLOR WORD DISPLAYED
DISK
GRADE: PRESCHOOL-2
12.95

IDEATECH COMPANY

MARCK

APPLE II, APPLE II+
16K WITH ROM INTEGER, BASIC

COMCAL
CMAM

BROCHURE
0.00

MR. EDWARD J. CAIN JR.
DIRECTOR OF STUDENT SERVICES
COMMACK PUBLIC SCHOOLS
POB 150
COMMACK, NEW YORK
COMMODORE
BASIC

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COMPARATIVE BUYING
CMAM
EXPLAINS THE CONCEPTS OF COMPARATIVE BUYING
INTREPRETIVE EDUCATION, INC.
QUEUE, INC.

DISK, BACK-UP
GRADE:JUNIOR-SENIOR HIGH
APPLE II, APPLE II+
48K, APPLESOFT
225.00

COMPUTER ANIMATED READING INSTRUCTIONAL SYSTEM
CMAM
SERIES OF PROGRAMS FOR BEGIN READER NOUN AND VERB SELECTION
BRITANNICA COMPUTER BASED
75 HOMER AVENUE UNIT ONE
TORONTO, ONT M8Z4X5
416-252-5907
APPLE II

SA A A A SA
100.00

COMPUTERIZED READING MACHINE
CMAM
TEN STORIES ARE PROVIDED AT A GRADE 6 LEVEL WITH A COMPREHENSION TEST FOR EACH STORY
DISK
SOUTHEASTERN EDUCATIONAL
QUEUE, INC.
5 CHAPEL HILL DRIVE
FAIRFIELD, CT 06432
PH. 1-800-232-2224
APPLE

60.00

CONSONANTS
CMAM
A COMPLETE SERIES OF PHONICS LESSONS ON SOUNDS OF CONSONANTS AND CONSONANT BLENDS
DISK
HARTLEY
QUEUE, INC.
5 CHAPEL HILL DRIVE
FAIRFIELD, CT 06432
1-800-232-2224
APPLE

79.95

CONTEMPORARY LIVING
CMAM
USES BRANCHING TECHNIQUES TO PRESENT MATERIAL EITHER AT FIFTH OR THIRD GRADE READING LEVEL RE:LIVING SKILLS
CASSETTE OR DISK, TEACHER'S GUIDE
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ACADEMIC SOFTWARE

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APPLE II-48K, TRS80-16K,
APPLESOFT
175.00

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COUNT 'EM
CMAM

STUDENT MUST COUNT NUMBER OF LOCOMOTIVES ON A TRAIN

CASSETTE OR DISK

MICRO ED
QUEUE, INC.
5 CHAPEL HILL DRIVE
FAIRFIELD, CT 06432
PH. 1-800-232-2224
PET,VIC20,COM. 64,TI 99/4

9.95

COUNT AND ADD
CMAM

GRADES K-2. TWO PROGRAMS USING SOUND AND GRAPHICS TO TEACH BASIC COUNTING AND ADDITION

DISK

EDU-SOFT (STEKETEE)
QUEUE, INC.
5 CHAPEL HILL DRIVE
FAIRFIELD, CT 06432
PH. 1-800-232-2224
APPLE

19.95

COUNTING
CMAM

THREE COUNTING TUTORIAL AND PRACTICE PROGRAMS

CASSETTE

JMH
QUEUE, INC.
5 CHAPEL HILL DRIVE
FAIRFIELD, CT 06432
PH. 1-800-232-2224
VIC-20,COM. 64, PET, ATARI

9.95

COUNTING BEE
CMAM

EIGHT EXERCISES FOR AGES 3-6. BLOCK COUNTING, CIRCLE COUNTING, COMPARING SHAPES AND COUNTING, ETC.
DISK

EDU-WARE SERVICES
QUEUE, INC.
5 CHAPEL HILL DRIVE
FAIRFIELD, CT 06432
PH. 1-800-232-2224
APPLE

29.95

DIRECTION AND DISTANCE
CMAM

TEACHES PRIMARY GRADE CHILDREN THE 8 DIRECTIONS - NORTH,SOUTH EAST, WEST, NORTHWEST, SOUTHWEST, NORTHEAST,SOUTHEAST
CASSETTE OR DISK
GRADE:PRIMARY

MICRO-ED, INC.
OPPORTUNITIES FOR LEARNING,INC
QUEUE, INC.
TEXAS INSTRUMENTS

COMMODORE 64, PET, TI99/4
BASIC

10.00

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DIVISION
CMAM

4 DISKS EACH WITH 7 DIFFERENT
DRILL PROGRAMS

AQUARIUS
QUEUE, INC.
5 CHAPEL HILL DRIVE
FAIRFIELD, CT 06432
PH. 1-800-232-2224
APPLE, TRS-80

DISK

115.00

DOLLAR AND CHANGE
CMAM

TEACHES STUDENTS TO MAKE
CHANGE FROM A DOLLAR BILL

MICRO-ED, INC.

CASSETTE OR DISK
GRADE:ELEMENTARY

COMMODORE 64, PET, VIC
3K MEMORY ENHANCEMENT, BASIC

14.95

DRESSING
CMAM

SUBJECTS COVERED ARE CLOTHES
AND DRESSING

AQUARIUS PUBLISHERS INC.

DISK
GRADE:SPECIAL ED., PRESCHOOLR

APPLE II
48K, APPLESOFT

65.00

EARLY ELEMENTARY I
CMAM

FOUR PROGRAMS - COUNT THE
SHAPES, COLOR MATCH, NUMBER
DRILL, TEACHER MANAGEMENT FILE

COMPU-TATIONS
QUEUE, INC.
5 CHAPEL HILL DRIVE
FAIRFIELD, CT 06432
1-800-232-2224
APPLE

DISK

29.95

EARLY ELEMENTARY II
CMAM

FOUR PROGRAMS - ALPHA DRILL,
ALPHABET LINE, INSIDE OUT,
NUMBER LINE

COMPU-TATIONS
QUEUE, INC.
5 CHAPEL HILL DRIVE
FAIRFIELD, CT 06432
PH. 1-800-232-2224
APPLE

DISK

29.95

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ALBERTA EDUCATION

COURSEWARE IN SPECIAL EDUCATION

EARLY GAMES
NINE EDUCATIONAL AND ENTERTAINING GAMES-NUMBERS AND LETTERS, COUNT COLORFUL BLOCKS, ETC.
DISK OR CASSETTE

CMAM
QUEUE, INC.
5 CHAPEL HILL DRIVE
FAIRFIELD, CT 06432
PH. 1-800-232-2224

APPLE, IBM, ATARI, TRS80
APPLE, IBM, ATARI-24K, TRS80-32K

29.95

EARLY LEARNING PACKAGE
SIX PROGRAMS FOR GRADES K-4

CASSETTE

CMAM
MERCER
QUEUE, INC.
5 CHAPEL HILL DRIVE
FAIRFIELD, CT 06432
PH. 1-800-232-2224
TRS80 MOD I OR III

35.00

EARLY WORDS
IDENTIFY CHARACTERISTIC SHAPE OF LETTERS, DEVELOP SIGHT VOCABULARY OF COLOR WORDS AND OF FAMILIAR OBJECTS, NUMERICS
DISK

D A A A A

CMAM
MERRY BEE COMMUNICATIONS
815 CREST DRIVE
OMAHA, NEBRASKA
68046
PH. 402-592-3479
APPLE
48K, BASIC, COLOR

19.95

FAMILY FUN
SERIES OF PROGRAMS FOR PRE-SCHOOLERS INCLUDING MIXING, MATCHING, SYMBOL CONCEPTS

CMAM
TECK ASSOCIATES
POB 8732
WHITE BEAR LAKE, MN 55110
612-429-5570

19.95

FIRST AID AND SAFETY
SIXTEEN-COURSE EDUCATIONAL PROGRAM

CMAM
DORSETT EDUCATIONAL SYSTEM
POB 1226
NORMAN, OK
73070
PH. 405-321-0000
ATARI 400, ATARI 800

79.00

1. EVALUATIONS WERE DONE BY DSS AND REPRESENT ONLY THE TECHNICAL STEP OF THE TOTAL EVALUATIVE PROCESS.
2. PRICES ARE LISTED FROM VENDORS IN CURRENT DOLLARS AND ARE SUBJECT TO CHANGE.

FOX AND GEESE CMAM

DEVELOPMENT OF GAMES SKILL, INCLUDING REASONING AND MOTOR CO-ORDINATION

J. M. LEONARD
M.D.T.S. LIB.
EDUCATION DEVELOPMENT CENTRE
36 WOLVERHAMPTON ROAD
WALSALL
TRS80 LII
16K

0.00

GAME POWER FOR PHONICS CMAM

SPECIAL GAMES FOR VIRTUALLY EVERY STRUCTURAL OR PHONETIC PART OF WORDS

CASSETTE, DISK

A A A A A

WISE OWL WORKSHOP
QUEUE, INC.
5 CHAPEL HILL DRIVE
FAIRFIELD, CT 06432
PH. 1-800-232-2224
TRS80, APPLE

25.00

GERTRUDE'S PUZZLES CMAM

GAMES HELP CHILD DEVELOP REASONING SKILLS BY MOVING PUZZLE PIECES TO FORM COLOR AND SHAPE PATTERNS
DISK
GRADE:1 AND UP

LEARNING COMPANY

APPLE II, APPLE II+
48K, APPLESOFT, COLOR MONITOR RECOMMENDED

75.00

GERTRUDE'S SECRETS CMAM

SERIES OF GAMES HELPS CHILD LEARN LOGICAL THINKING WHILE PLAYING WITH COLORS AND SHAPES

DISK
GRADE:K-4

LEARNING COMPANY

APPLE II, APPLE II+
48K, APPLESOFT, COLOR MONITOR RECOMMENDED

75.00

GOOD HEALTH HABITS CMAM

COVERS WEIGHT AND HEIGHT, CARE OF TEETH, VISITS TO DENTIST, NUTRITION, GOOD SLEEP HABITS, AND CARE OF MIND
CASSETTE OR DISK, SOURCE CODE
GRADE:1

RIGHT ON PROGRAMS

APPLE II, PET
APPLE II-48K, PET-16K, APPLESOFT

15.00

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ALBERTA EDUCATION

COURSEWARE IN SPECIAL EDUCATION

GRADUATED CYLINDER
STUDENT LEARNS TO READ A SCALE
USING GRAPHIC REPRESENTATION

CASSETTE

15.00

CMAM
COW BAY COMPUTING

PET

HARTLEY: MULTIPLE SKILLS
INVOLVES WORD DISCRIMINATION,
WORD USAGE ASSOCIATED WITH
STRUCTURAL ANALYSIS SKILLS

MANUAL

0.00

CMAM
HARTLEY COURSEWARE INC.
POB 431
DIMONDALE, MICHIGAN
48821
PH. 616-942-8987
APPLE
48K, BASIC, COLOR GRAPHICS,
PRINTERS, CASSETTE RECORDER

HICKORY DICKORY
HELPS STUDENT LEARN TO TELL
TIME ON TRADITIONAL CLOCKFACE
AND TRANSLATE TIME INTO
DIGITAL TERMS
CASSETTE OR DISK
GRADE: 2-6

15.95

CMAM
APX (ATARI PROGRAM EXCHANGE)
ACADEMIC SOFTWARE

ATARI 400 OR 800
16K (CASSETTE), 24K (DISKETTE)
JOYSTICK CONTROLLER OPTIONAL

HODGE PODGE
MANY CARTOONS, ANIMATIONS, AND
SONGS WHICH APPEAR WHEN ANY
KEY ON THE COMPUTER IS
DEPRESSED
DISK

D A A A A

18.95

CMAM
DYNACOMP
QUEUE, INC.
5 CHAPEL HILL DRIVE
FAIRFIELD, CT 06432
PH. 1-800-232-2224
APPLE

INTELLIGENT VIDEODISC FOR SPECIAL ED. TECHNOLOGY
MATCHING SHAPES AND SIZES.
MULTI-MEDIA USING VIDEO DISC
TOUCH PANEL AND MICRO INCLUDES
RECORD KEEPING SUPPORT

0.00

CMAM
EXCEPTIONAL CHILD CENTER
UMC 68
UTAH STATE UNIVERSITY
LOGAN, UTAH 84321
APPLE II

1. EVALUATIONS WERE DONE BY DSS AND REPRESENT ONLY THE TECHNICAL STEP OF THE TOTAL EVALUATIVE PROCESS.
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INTRODUCTION TO MATHEMATICS ONTHE COMPUTER CMAM

COVERS ADDITION, SUBTRACTION,
MULTIPLICAION AND DIVISION

EDUCATIONAL ACTIVITIES
QUEUE, INC.
5 CHAPEL HILL DRIVE
FAIRFIELD, CT 06432
PH. 1-800-232-2224
APPLE, PET, TRS-80, ATARI

CASSETTE, DISK

40.00

JUGGLES' RAINBOW CMAM

ENABLES CHILDREN AGED THREE TO
SIX TO PLAY SPATIAL GAMES ON
COMPUTER BEFORE THEY CAN READ

LEARNING COMPANY

DISK
GRADE:PRESCHOOL-K

APPLE II, APPLE II+
48K, APPLESOFT, COLOR MONITOR
RECOMMENDED

45.00

K-1 LANGUAGE PACKAGE CMAM

THREE PROGRAMS ON UPPER/LOWER
CASE MATCHING, ABC SEQUENCE,
AND MISSING LETTERS.

LITTLE BEE
QUEUE, INC.
5 CHAPEL HILL DRIVE
FAIRFIELD, CT 06432
PH. 1-800-232-2224
TRS80 MOD I OR III

CASSETTE

31.95

K-1 MATHEMATICS PACKAGE CMAM

THREE PROGRAMS ON COUNTING,
MATCHING NUMERALS AND WORDS,
AND MISSING NUMBERS

LITTLE BEE
QUEUE, INC.
5 CHAPEL HILL DRIVE
FAIRFIELD, CT 06432
PH. 1-800-232-2224
TRS-80

CASSETTE

31.95

KIDSTUFF & TURTLE TRACKS CMAM

KIDSTUFF
SCHOLASTIC, WIZWARE
730 BROADWAY
NY, NY
10003
APPLE, COMMODORE, ATARI, ETC.
MEMORY REQUIREMENTS VARY,
COLOR GRAPHICS

MANUAL, BACK-UP, DISK,
CASSETTE

70.00

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ALBERTA EDUCATION

COURSEWARE IN SPECIAL EDUCATION

CMAM

EARNING & PRACTICING WITH MONEY £50

JERRY PERSINGER
RESOURCE SOFTWARE INTERN'L.
330 NEW BRUNSWICK AVE.
FORDS, NJ
08863
MICROCOMPUTERS USING CP/M MP/M
BASIC

69.00

CMAM

LETTER PROGRAMS
FOUR PROGRAMS FOR PRE-READERS

DISK

LANE ROBBINS
QUEUE, INC.
5 CHAPEL HILL DRIVE
FAIRFIELD, CT 06432
PH. 1-800-232-2224
APPLE, PET

39.95

CMAM

LETTER RECOGNITION
LETTERS AND NUMERALS ARE PRESENTED. THE STUDENT MUST FIND THE CORRESPONDING LETTER OR NUMERAL ON THE KEY BOARD.
DISK

HARTLEY
QUEUE, INC.
5 CHAPEL HILL DRIVE
FAIRFIELD, CT 06432
PH. 1-800-232-2224
APPLE

26.95

CMAM

LIFESKILL READING SERIES I
8 PROGRAMS FOR INTEREST LEVEL GR. 6-12 AND READING LEVEL 2-4 INCLUDING SIGNS ON HIGHWAYS, FOOD PURCHASING SKILLS, ETC.
DISK, CASSETTE

MEDIA MATERIALS
QUEUE, INC.
5 CHAPEL HILL DRIVE
FAIRFIELD, CT 06432
PH. 1-800-232-2224
APPLE, TRS-80

240.00

CMAM

LIFESKILL READING SERIES II
7 PROGRAMS COVERING TOPICS SUCH AS USING A TELEPHONE BOOK, JOB HUNTING SKILL, EVERYDAY FINANCIAL MGMT., ETC.
DISK

MEDIA MATERIALS
QUEUE, INC.
5 CHAPEL HILL DRIVE
FAIRFIELD, CT 06432
PH. 1-800-232-2224
APPLE, TRS-80

209.65

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LONG DIVISION

RANDOMLY GENERATED PROBLEMS
DESIGNED BY THE STUDENT WHO
CHOOSES A 1, 2, OR 3 DIGIT
DIVISOR
DISK, CASSETTE

CMAM
MICROCOMPUTER WORKSHOPS
QUEUE, INC.
5 CHAPEL HILL DRIVE
FAIRFIELD, CT 06432
PH. 1-800-232-2224
APPLE, TRS-80, PET, ATARI

25.00

MAP READING

AN INTRODUCTION TO DIRECTION
AND DISTANCE

DISK
GRADE:4 AND UP

CMAM
MICRO POWER & LIGHT COMPANY
ACADEMIC SOFTWARE
K-12 MICROMEDIA
QUEUE, INC.

APPLE II
32K, APPLESOFT

19.95

MARKET SURVEY

PERFORMS COST ANALYSIS,
CALCULATES SAVINGS AND TALLIES
THE NUMBER OF BARGAINS AT
EACH STORE AS SET BY THE CLASS
CASSETTE OR DISK

CMAM
COMALDOR

PET

20.00

MATCH IT

PROVIDES PRACTICE IN ESSENTIAL
SKILLS OF LETTER RECOGNITION

CASSETTE, DISK

CMAM
BERTAMAX
QUEUE, INC.
5 CHAPEL HILL DRIVE
FAIRFIELD, CT 06432
PH. 1-800-232-2224
TRS80

25.00

MATCHING CAPITAL LETTERS, SMALL WITH CAPITALS

THREE PROGRAMS ON EARLY
READING READINESS

CMAM
MICRO ED.
QUEUE, INC.
5 CHAPEL HILL DRIVE
FAIRFIELD, CT 06432
PH. 1-800-232-2224
PET, VIC 20

23.75

1. EVALUATIONS WERE DONE BY DSS AND REPRESENT ONLY THE TECHNICAL STEP OF THE TOTAL EVALUATIVE PROCESS.

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COURSEWARE IN SPECIAL EDUCATION

MATH - MONEY STUDENT IS GIVEN SEVERAL REASONS WHY UNDERSTANDING OF MONEY AND THE ABILITY TO ADD SUBTRACT, ETC. ARE IMPORTANT SOURCE CODE, CASSETTE OR DISKETTE 15.00	CMAM RIGHT ON PROGRAMS ACADEMIC SOFTWARE QUEUE, INC. APPLE II, PET APPLE II-48K, PET-16K, APPLESOFT
MATH - TELLING TIME BASIC CONCEPTS OF THE CLOCK AND TELLING TIME ARE INTRODUCED SOURCE CODE, CASSETTE OR DISK GRADE:2 15.00	CMAM RIGHT ON PROGRAMS ACADEMIC SOFTWARE QUEUE, INC. APPLE II, PET APPLE II-48K, PET-16K, APPLESOFT
MATH BID STUDENT MUST BID ON HIS/HER ABILITY TO SOLVE PROBLEMS IN ADDITION, MULTIPLICATION, SUBTRACTION AND DIVISION. CASSETTE, DISK 7.95	CMAM MICRO ED QUEUE, INC. 5 CHAPEL HILL DRIVE FAIRFIELD, CT 06432 PH. 1-800-232-2224 VIC-20, PET, COM. 64
MATH FOR EVERYDAY LIVING REAL-LIFE MATH AD BUSINESS SKILLS ARE TAUGHT CASSETTE, DISK 85.00	CMAM EDUCATIONAL ACTIVITIES QUEUE, INC. 5 CHAPEL HILL DRIVE FAIRFIELD, CT 06432 PH. 1-800-232-2224 PET, TRS-80, APPLE, ATARI
MATH FOR THE YOUNG CONSUMER INVOLVES STUDENTS IN USING MATH SKILLS TO SOLVE SITUATIONS CONFRONTING THE CONSUMER CASSETTE, DISK 67.00	CMAM ORANGE CHERRY MEDIA QUEUE, INC. 5 CHAPEL HILL DRIVE FAIRFIELD, CT 06432 PH. 1-800-232-2224 PET, TRS-80, APPLE

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MATH INVADERS CMAM

MANUAL, BROCHURE, DISK

45.00

WINNERS CIRCLE EDUCATION CO.
SUITE 1308 TEMPLE BUILDING
DORCHESTER NEW YORK
14604
PH. 716-325-6493
APPLE
48K, BASIC, APPLESOFT

MATH LAB CMAM

SERIES OF PROGRAMS WITH GOOD
STUDENT RECORD KEEPING

A A A A A

80.00

A. CROMER
EDUTECH, INC.
634 COMMONWEALTH AVE
NEWTON CENTRE, MA 02159
PH. 617-965-4813
APPLE

MATH MACHINE CMAM

INSTRUCTIONAL OBJECTIVES COVER PRE-MATH THROUGH DIVISION SKILLS. INNOVATIVE REINFORCEMENT SYSTEM.
MANUAL, DISK, BACK-UP

A A A SA A

79.95

SOUTHWEST EDPSYCH SERVICES,
POB 1870
PHOENIX, ARIZONA
85001
PH. 602-253-6528
APPLE
48K, BASIC, COLOR GRAPHICS

MATH PACKAGE CMAM

FIVE PROGRAMS ON ADDITION, SUBTRACTION, MULTIPLICATION, DIVISION, INCHES, FEET, YARDS, AND MILES, ETC.
CASSETTE

59.95

8K SOFTWARE
QUEUE, INC.
5 CHAPEL HILL DRIVE
FAIRFIELD, CT 06432
PH. 1-800-232-2224
PET, VIC-20

MATH'S FOR FUN CMAM

PRACTICE IN BASIC MATH SKILLS SUITABLE FOR AGES 6 AND UP

TAPE, DISK

14.95

EDUCATIONAL SOFTWARE
QUEUE, INC.
5 CHAPEL HILL DRIVE
FAIRFIELD, CT 06432
PH. 1-800-232-2224
ATARI

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MCE CMAM

MANUAL, BROCHURE, DISK

F. M. TABER
KALAMAZOO MALL
SUITE 250, PLAZA BUILDING
KALAMAZOO, MICHEGAN
49007
APPLE
48K, COLOR GRAPHICS, PRINTER
DESIREABLE BUT NOT NECESSARY

0.00

MICROCOMPUTER BASED VERBAL EXCHANGE FOR THE HANDICAPPED CMAM

SERIES OF PROGRAMS DIRECTED TO LD, VISUAL IMPAIRED, AND/OR SPEECH IMPAIRED. ARITHEMATIC PROBLEMS PRESENTED VISUALLY

A.E.SPRINGER
DEPT. OF ENGINEERING-SCIENCE
KILGORE COLLEGE
KILGORE, TEXAS

TRS-80

0.00

MICROCOSM I CMAM

THIRTY PROGRAMS INCLUDING NUMEROUS GAMES

CASSETTE

BASICS & BEYOND, INC.
QUEUE, INC.
5 CHAPEL HILL DRIVE
FAIRFIELD, CT 06432
PH. 1-800-232-2224
TRS80

19.95

MICROCOSM II CMAM

TWENTY ORIGINAL PROGRAMS INCLUDING STATE GUESS, SPELLING BEE, PREFIX STUDY AND QUIZ, ETC.

CASSETTE

BASICS & BEYOND, INC.
QUEUE, IN.
5 CHAPEL HILL DRIVE
FAIRFIELD, CT 06432
PH. 1-800-232-2224
TRS80

19.95

MONEY MASTER CMAM

TUTORS THE YOUNG CHILD IN THE USE OF MONEY

CASSETTE

MED SYSTEMS
QUEUE, INC.
5 CHAPEL HILL DRIVE
FAIRFIELD, CT 06432
PH. 1-800-232-2224
TRS-80

17.95

1. EVALUATIONS WERE DONE BY DSS AND REPRESENT ONLY THE TECHNICAL STEP OF THE TOTAL EVALUATIVE PROCESS.
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MONEY! MONEY!
PROVIDES PRACTICE IN WORKING WITH CONCEPTS INVOLVING MONEY

DISK
GRADE:2-5

CMAM
HARTLEY COURSEWARE, INC.

APPLE II
48K, APPLESOFT

39.95

MORE THAN TEN
DESIGNED TO HELP THE STUDENT UNDERSTAND ADDITION AND SUBTRACTION WHEN THE SUM IS MORE THAN TEN, ETC.
CASSETTE, DISK

CMAM
MICROCOMPUTER WORKSHOPS
QUEUE, INC.
5 CHAPEL HILL DRIVE
FAIRFIELD, CT 06432
PH. 1-800-232-2224
PET, APPLE

40.00

MULTIPLICATION
FOUR DISK PACKAGE WITH PRE-TEST

DISK

CMAM
AQUARIUS
QUEUE, INC.
5 CHAPEL HILL DRIVE
FAIRFIELD, CT 06432
PH. 1-800-232-2224
APPLE, TRS80

115.00

NAME JUMBLE AND WHAT NAME
CHILD'S NAME IN INPUT AT TOP OF SCREEN, THEN JUMBLED IN THE MIDDLE. CHILD SELECTS LETTERS TO REFORM NAME

CMAM
T. J. KITCHEN
M.D.T.S. LIB.
EDUCATION DEVELOPMENT CENTRE
36 WOLVERHAMPTON ROAD
WALSALL
TRS80 LII
16K, OPTIONAL INTERFACE (SINGLE SWITCH)

0.00

NUMBER LINE PACKAGE
FOUR PROGRAMS ON WHICH NUMBER COMES AFTER, BEFORE, WHICH NUMBER IS MISSING, AND THE MEANING OF "1ST, 2ND, AND 3RD"
DISK

CMAM
LANE ROBBINS
QUEUE, INC.
5 CHAPEL HILL DRIVE
FAIRFIELD, CT 06432
PH. 1-800-232-2224
APPLE, PET

39.95

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NURSERY TIME CMAM

DEVELOPS LITERARY APPRECIATION
AND VERBAL FLUENCY

DISK, BOOKLET

D A A A A

MERRY BEE COMMUNICATIONS
QUEUE, INC.
5 CHAPEL HILL DRIVE
FAIRFIELD, CT 06432
PH. 1-800-232-2224
APPLE

29.95

OUR WEIRD AND WACKY WORLD- LITERAL COMPREHENSION CMAM

COMPUTER ASSISTED READING
PROGRAM FOR CHILDREN WITH
READING LEVEL OF 3-4.

DISK, CASSETTE

EDUCATIONAL ACTIVITIES
QUEUE, INC.
5 CHAPEL HILL DRIVE
FAIRFIELD, CT 06432
PH. 1-800-232-2224
APPLE, PET, TRS80

40.00

OUR WEIRD AND WACKY WORLD- CRITICAL READING PROGRAM CMAM

COMPUTER ASSISTED READING
PROGRAM FOR CHILDREN WITH

DISK, CASSETTE

EDUCATIONAL ACTIVITIES
QUEUE, INC.
5 CHAPEL HILL DRIVE
FAIRFIELD, CT 06432
PH. 1-800-232-2224
APPLE, PET, TRS-80

34.95

OUR WILD AND CRAZY WORLD CMAM

SIXTEEN TRUE, HUMOROUS STORIES
WITH READING COMPREHENSION
EXERCISES

CASSETTE, DISK

EDUCATIONAL ACTIVITIES
QUEUE, INC.
5 CHAPEL HILL DRIVE
FAIRFIELD, CT 06432
PH. 1-800-232-2224
APPLE, PET, TRS-80, ATARI

85.00

PAL CMAM

USES A DIAGNOSTIC AND
REMEDIATION APPROACH TO
TEACHING READING

DISK

UNIVERSAL SYSTEMS FOR
QUEUE, INC.
5 CHAPEL HILL DRIVE
FAIRFIELD, CT 06432
PH. 1-800-232-2224
APPLE

100.00

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PERSONAL CONSUMERISM CMAM
USES BRANCHING TECHNIQUES TO
PRESENT MATERIAL EITHER AT
FIFTH OR THIRD GRADE READING
LEVEL RE: CONSUMERISM
CASSETTE OR DISK
GRADE:3-5

AQUARIUS PUBLISHERS INC.
ACADEMIC SOFTWARE
OPPORTUNITIES FOR LEARNING, INC

APPLE II, TRS80 MOD I OR III
APPLE II-48K, TRS80-16K

235.00

PERSONAL FINANCE CMAM
USES BRANCHING TECHNIQUES TO
PRESENT MATERIAL, EITHER AT
FIFTH OR THIRD GRADE READING
LEVEL RE: PERSONAL FINANCE
CASSETTE OR DISK, TEACHERS'
GUIDE

AQUARIUS PUBLISHERS INC.
ACADEMIC SOFTWARE
OPPORTUNITIES FOR LEARNING, INC

APPLE II, TRS80 MOD I OR III
APPLE II-48K, TRS80-16K,
APPLESOFT

199.00

PICTURE COUNTING CMAM
UP TO 12 SIMILAR OR ASSORTED
PICTURES PRESENTED POSITIONED
RANDOMLY ON A 4 BY 3 GRID TO
BE COUNTED

T. J. KITCHEN
M.D.T.S. LIB
EDUCATION DEVELOPMENT CENTRE
36 WOLVERHAMPTON ROAD
WALSALL
TRS80 LII
16K, OPTIONAL INTERFACE
(SINGLE SWITCH)

0.00

PRESCHOOL IQ BUILDER CMAM
TEACHES COGNITIVE SKILLS
WITH FORMS AND LETTER MATCHING

PARENTS GUIDE INCLUDED

PROGRAM DESIGN INC
11 IDAR COURT
GREENWICH, CT 06830
203-661-8799
APPLE

23.95

PRESCHOOL MATH PACKAGE CMAM
FOUR PROGRAMS ON RECOGNIZING
NUMBERS AND COUNTING NUMBERS

DISK

LANE ROBBINS
QUEUE, INC.
5 CHAPEL HILL DRIVE
FAIRFIELD, CT 06432
PH. 1-800-232-2224
APPLE, PET

39.95

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COURSEWARE IN SPECIAL EDUCATION

RACE 2
INDIVIDUALLY CONTROLLED SQUARES MOVED AROUND A TRACK BY 1 TO 4 CHILDREN, WITH OR W/OUT REVERSING SKILL FACTORS
0.00

CMAM
T. J. KITCHEN
M.D.T.S. LIB.
EDUCATION DEVELOPMENT CENTRE
36 WOLVERHAMPTON ROAD
WALSALL
TRS80
16K LII, USING UP TO FOUR SWITCHES VIA INTERFACE

READING COMPREHENSION III
READING MATERIAL ON AUTO MECHANICS
CASSETTES
79.00

CMAM
DORSETT
QUEUE, INC.
5 CHAPEL HILL DRIVE
FAIRFIELD, CT 06432
PH. 1-800-232-2224
ATARI, TRS-80

READING COMPREHENSION IV
READING MATERIALS ON GENERAL SHOP PRACTICES
CASSETTE
79.00

CMAM
DORSETT
QUEUE, INC.
5 CHAPEL HILL DRIVE
FAIRFIELD, CT 06432
PH. 1-800-232-2224
ATARI, TRS-80

ROCKY'S BOOTS
GAMES HELP CHILD DEVELOP LOGIC SKILLS THAT WILL BE OF USE THROUGHOUT LIFE
DISK
GRADE:2 AND UP
75.00

CMAM
LEARNING COMPANY
APPLE II, APPLE II+
48K, APPLESOFT, COLOR MONITOR RECOMMENDED

SCRAMBLED LETTERS AND FLASH SPELLING
CASSETTE
14.95

CMAM
EDUCATIONAL ACTIVITIES
POB 392
FREEPORT, NY
11520
PH. 516-223-4663
TRS-80 MODEL I

1. EVALUATIONS WERE DONE BY DSS AND REPRESENT ONLY THE TECHNICAL STEP OF THE TOTAL EVALUATIVE PROCESS.
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SHAPE PACKAGE

CMAM

TWO PROGRAMS ON MATCHING SHAPES

DISK

LANE ROBBINS
QUEUE, INC.
5 CHAPEL HILL DRIVE
FAIRFIELD, CT 06432
PH. 1-800-232-2224
APPLE, PET

19.95

SHAPES

CMAM

A SELF ASSESSING MATCHING AND DISCRIMINATION PROGRAM USING UP TO TEN SHAPES

T. J. KITCHEN
M.D.T.S. LIB.
EDUCATION DEVELOPMENT CENTRE
36 WOLVERHAMPTON ROAD
WALSALL
TRS80 LII
16K, OPTIONAL INTERFACE (SINGLE SWITCH)

0.00

SPACE WASTE RACE

CMAM

A COMPUTERIZED STORYBOOK TO BE READ TO CHILDREN, WITH EXERCISES.

DISK

STORYBOOKS OF THE FUTURE
QUEUE, INC.
5 CHAPEL HILL DRIVE
FAIRFIELD, CT 06432
PH. 1-800-232-2224
TRS80 MOD I OR III

24.95

SPELLING BEE WITH READING PRIMER

CMAM

TWO PROGRAMS INTRODUCE THE LEARNER TO SPELLING AND READING

DISK

A A A A A

EDU-WARE SERVICES
QUEUE, INC.
5 CHAPEL HILL DRIVE
FAIRFIELD, CT 06432
PH. 1-800-232-2224
APPLE

34.95

STRANGE ENCOUNTERS: YOU DECIDE

CMAM

STUDENTS READ AND ANALYZE EVIDENCE ON THE BERMUDA TRIANGLE, BIGFOOT OF THE MOUNTAINS, ETC.

CASSETTE OR DISK

ORANGE CHERRY MEDIA
QUEUE, INC.
5 CHAPEL HILL DRIVE
FAIRFIELD, CT 06432
PH. 1-800-232-2224
APPLE, PET, TRS-80

67.00

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ALBERTA EDUCATION

COURSEWARE IN SPECIAL EDUCATION

SUBTRACTION CMAM

PRACTICE IN SUBTRACTION WITH THE OPTION OF BORROWING

DISK, CASSETTE

MICROCOMPUTER WORKSHOPS
QUEUE, INC.
5 CHAPEL HILL DRIVE
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APPLE, TRS-80, PET, ATARI

20.00

SURVIVAL MATH CMAM

INCLUDES 4 SIMULATIONS THAT APPLY MATH SKILLS TO EVERYDAY LIFE

DISK
GRADE:4 AND UP

SUNBURST COMMUNICATIONS

APPLE II
32K

50.00

TELLING TIME CMAM

THREE PROGRAMS: HOUR CLOCK, HALF-HOUR CLOCK, AND QUARTER-HOUR CLOCK

CASSETTE, DISK

BERTAMAX
QUEUE, INC.
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FAIRFIELD, CT 06432
PH. 1-800-232-2224
TRS-80

54.50

TELLING TIME COMPUTER SET CMAM

EXPLAINS HOW TO TELL TIME

CASSETTE OR DISK
GRADE:K-3
A A A A A

ORANGE CHERRY MEDIA
ACADEMIC SOFTWARE
K-12 MICROMEDIA
QUEUE, INC.

PET 2000 OR 4000, TRS80, APPLE
16K

34.00

TENNIS ANYONE CMAM

LEARNING GAMES WHICH REQUIRE THE CORRECT APPLICATION OF SPECIFIC READING SKILLS IN ORDER TO BE WON
MANUAL, DISK

A A A A A

DATA COMMAND
329 EAST COURT STREET
KANKAKEE, ILLINOIS
60901
PH. 815-433-7735
APPLE, RADIO SHACK I OR III
BASIC

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2. PRICES ARE LISTED FROM VENDORS IN CURRENT DOLLARS AND ARE SUBJECT TO CHANGE.

ALBERTA EDUCATION

COURSEWARE IN SPECIAL EDUCATION

THE PEAR TREE
CMAM
INSTRUCTION IN LANGUAGE ARTS, MATHEMATICS AND READING SKILLS FOR GRADE LEVEL K-4

SOUTHEASTERN SOFTWARE
QUEUE, INC.
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FAIRFIELD, CT 06432
PH. 1-800-232-2224
APPLE

DISK

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CMAM
COVERS READING SKILLS TYPICALLY TAUGHT IN KINDERGARTEN THRU 3RD GRADE CLASSROOMS

SOUTHWEST EDPSYCH SERVICES,
QUEUE, INC.
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APPLE

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CMAM

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FAIRFIELD, CT 06432
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APPLE

DISK

120.00

THEIR WORLD
CMAM
FIVE PROGRAMS CONTAIN WORDS TAKEN FROM THE VOCABULARY OF YOUNG CHILDREN

AQUARIUS
QUEUE, INC.
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PH. 1-800-232-2224
APPLE

DISK

160.00

TIC TAC TOE - HARD & SOFT C
CMAM
LEARNING C WORD PATTERNS

JERALD GREENBERG
MICROCOMPUTERS CORPORATION
34 MAPLE AVENUE/BOX B
ARMONK, NY
10504
TI 99/4, TI 99/4A
BASIC

CASSETTE

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TIC TAC TOE - HARD & SOFT 6
LEARNING 6 WORD PATTERNS

CASSETTE

9.95

CMAM
JERALD GREENBERG
MICROCOMPUTERS CORPORATION
34 MAPLE AVENUE/BOX 8
ARMONK, NY
10504
TI-99/4, TI-99/4A
BASIC

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OFFERS THREE TYPES OF
INSTRUCTION IN TELLING TIME

DISK

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48K, APPLESOFT

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RANDOM MATH PROBLEMS QUICKLY
AND EFFICIENTLY. USER DECIDES
PROB. TYPE AND DIFFICULTY.
MANUAL, TAPE

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PH. 617-862-4141
TRS-80 MOD I/III, LEV. 2
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FOCUSES ON TELLING TIME FROM
ONE ZONE TO ANOTHER

CASSETTE OR DISK
GRADE:ELEMENTARY AND UP

7.95

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QUEUE, INC.

COMMODORE 64, PET
BASIC

USING A CALENDAR
PRESENTS CALENDAR CONCEPTS,
INCLUDING SIMPLE DATE-DAY
RELATIONSHIPS

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GRADE:2-4

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APPLE II
48K, APPLESOFT

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USING A CALENDAR - GRADES 2 TO4

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HARTLEY COURSEWARE, INC.
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APPLE II+
48K, APPLESOFT BASIC

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TEACHES THE VALUE OF COINS AND CURRENCY, HOW MONEY IS USED TO PAY FOR THINGS AND HOW TO CALCULATE THE CORRECT CHANGE
CASSETTE OR DISK
GRADE:2-4

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ORANGE CHERRY MEDIA
ACADEMIC SOFTWARE
K-12 MICROMEDIA

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16K

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APPLE

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CASSETTE

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QUEUE, INC.
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5 COM. 64, PET, ATARI, VIC-20

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WHO, WHAT, WHERE, WHEN, WHY
EACH LESSON CONTAINS TWENTY PRESENTATIONS ON COMBINATIONS OF WHO, WHAT, ETC.

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QUEUE, INC.
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APPLE

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COURSEWARE IN SPECIAL EDUCATION

CMAM

WINDOWS TO READING

BEGINNING WORD ATTACK SKILLS,
A PACKAGE OF 383 PROGRAMS

MANUAL

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CMAM

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APPLE

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CMAM

WORD WISE BASAL 1

DRILL AND PRACTICE WITH WORD LISTS

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ST. PAUL, MN
55113

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48K

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WORD WISE BASAL 2

DRILL AND PRACTICE WITH WORD LISTS

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48K

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WORD WISE BASAL 3

DRILL AND PRACTICE WITH WORD LISTS

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INTRODUCES THE CONCEPT OF A BANK

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GRADE:JUNIOR-SENIOR HIGH

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PET, ATARI

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48K, BASIC
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MANUAL, DISK
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32K, APPLESOFT
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16K, APPLESOFT
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DISK,BACKUP
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LIFE SIUATIONS, ENABLING
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MEMORY SKILLS

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DESCRIBES WAYS IN WHICH ONE
MAY BE POISONED, TYPES,
PREVENTATIVE TECHNIQUES AND
WHAT TO DO IF POISONING OCCURS
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SKILLS, VOCABULARY AND MONEY
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48K, APPLESOFT

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MANUAL, SOURCE CODE, DISK

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SP ED READ/SP ED MATH	SERIES OF PROGRAMS THAT ASSIST IN AUTHORING REMEDIAL DRILL AND PRACTICE	3000.00	EMCM	MEAN 256 NORTH WASHINGTON STREET FALLS CHURCH, VIRGINIA 22046 703-536-2310 MARK SENSE CARD READER
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B. BIBLIOGRAPHY

C. GLOSSARY OF TERMS

D. SAMPLE SURVEY FORM

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	Maryland Computer Services Inc.		502 Rock Spring Avenue	Bel Air	Maryland	21014
Mr. W. Lamprell, Assist. Director	Maryland Rehabilitation Center		2301 Argonne Drive	Baltimore	Maryland	21218
	Materials Review & Evaluation Centre	Computer Courseware Prov.	State Dept. of Instruction	Raleigh	N.C.	27611
Dale Collis	Math Instruction for Basic Skills	Moscow Public School District #281	410 East Third Street	Moscow	Idaho	83843
J. McDonald	McDonald		4614 First Avenue N.E.	Seattle	Washington	98105
	MCE Inc.		157 South Kalamazoo Mall, Ste. 250	Kalamazoo,	Michigan	49007
	McGraw Hill Inc.		POB 397	Hancock	New Hampshire	03449
	MECC		2520 Broadway Drive	St. Paul	Minnesota	55113
	Media Materials, Inc.		2936 Remington Avenue	Baltimore,	Maryland	21211
C. Oyler	Memorial Hospital		201 S. Gammon Rd.	Madison	Wisconsin	53717
	Merry Bee Communications		815 Crest Drive	Omaha,	Newbraska	68046
	Michigan Assoc. for Computer Users	Wayne Intermediate School District	33500 Van Bord Rd.	Wayne	M.I.	48184
	Michigan State Dept. of Education	Special Education Services	P.O. Box 30008	Lansing	Michigan	48902
	Micro Computer Directory	Gutman Library	Harvard University	Cambridge	Massachusetts	02138
	Micro Computer Education	Applications Network	256 North Washington Street	Falls Church	V.A.	22046
	Micro Computer Interest Group	Jefferson Medical College	Dept. of Neurosurgery	Philadelphia	Pennsylvania	19107
	Micro Educational		POB 24156	Minneapolis	Minnesota	55424
	Micro Learningware		POB 2134	North Mankato	M.N.	56001
	Micro Sift Project	Northwest Regional Ed. Laboratory	710 SW 2nd Avenue	Portland	Oregon	97204
Margie Mason	Microcomputer Assistance for Special	Community Unit School District #1	410 West Polk Street	Charleston	Illinois	61920
	Microcomputer Education Applications	(MEAN)	256 North Washington Street	Falls Church	Virginia	22046
	Microcomputer Workshops Corp.		103 Puritan Drive	Port Chester,	New York	10573
	Micrometics, Inc.		181 North 200 West Suite 5	Bountiful,	Utah	84010
	Micro. Resource Center	Teachers College	Columbia University, Box 18	New York	New York	10027
	Mid-Warwickshire College of	Further Education	Brooklands, Warwick New Road	Leamington SPA	England	CV32 5JE
	Milliken		1100 Research Blvd.	St. Louis	M.O.	63132

	Milton Bradley Educational Software	W.E. Cole Supply	PCB 1717	Pasadena	Texas	77501
Ron Fitzgerald	Minuteman Regional Vocational	Technical School	758 Marrett Road	Lexington	M.A.	02173
Dann McGinnis	Monroe Elementary School		3615 Cassia Street	Boise	Idaho	83705
Jack Cook	Moreno Valley Gifted & Talented	Education Program	13911 Perris Boulevard	Sunnymead	California	92388
	Morning Star		2535 College Avenue #301	Berkley	California	94704
	M.A.C.U.L.	Wayne County Interm. School Dist.	33500 Van Born	Wayne	Michigan	48184
	M.C.E. Incorporated		Suite 250, 157 Kalamazoo Mall	Kalamazoo	Michigan	49007
Jay C. Hardin	NASA Langley Research Center			Hampton	Virginia	23665
	National Easter Seal Society		2023 West Ogden	Chicago,	Illinois	60615
	National Ed. Association		1201 16th St. N.W.	Washington	D.C.	20036
	National Learning Corporation		312 Michael Drive	Syosset,	New York	11791
	New Jersey Institute of Technology	Division of Continuing Education	323 High Street	Newark	New Jersey	07102
Collin Richards, Director	Newcastle Semerc, Newcastle Polytechnic	Coach Lane Campus	New Castle Upon Tyne		England	NE7 7XA
	Nibble		PCB 325	Lincoln	M.A.	01773
Judy Montgomery	Non-Oral Communication Centre	Plavan School	9675 Warner Avenue	Fountain Valley	California	92708
Mary Larsson	Non-Oral Communication Project	R.H. Dana Exceptional Needs	24242 La Cresta Avenue	Dana Point	California	92629
Joanne Ligamari	Non-Oral Project	Newcastle School for Exceptional	P. O. Box 58	Newcastle	California	95658
Jean Katz	Non-Speech Communication Project	Office of the Los Angeles County	9300 East Imperial Highway	Downey	California	90242
Dale E. McDonald	North Hills School District		53 Rochester Road	Pittsburgh	P.A.	15229
D. Hutchinson	North Nottinghamshire College	of Further Education	Carlton Road	Worksop	England	S81 7HP
Samuel Dean	Northern Bedford County School District		RD 1	Hopewell	P.A.	16650
Craig W. Redcalthorne	NUREP		345 E. Superior, Room 1441	Chicago,	IL	60611
	N.I.R.E.		97 Decker Road	Butler,	NJ	07405
Robert Patterson	Oak Creek-Franklin Joint City	School District #1	340 East Puetz Road	Oak Creek	W.I.	53154
Robert Arvin	Oldham County Board of Education			La Grange	Kentucky	40031
	Ontario Crippled Children's Center		P.O. Box 1700, Station "R"	Toronto	Ontario	M4G 1R8
	Opportunities for Learning Inc.	Dept. 20C	8950 Lurline Avenue	Chatsworth	California	91311
	Osborne/McGraw Hill		630 Bancroft Way	Berkeley	California	74710
	Ottawa Crippled Children's		395 Smyth Road	Ottawa	Ontario ,	K1G 3H9
David L. Jaffe	Palo Alto Veterans Administration	Medical Centre				
Laura F. Meyers, Ph.D.	FEAL Software Inc.		1725 Promenade, No. 323	Santa Monica,	CA	90401
Mitzi Banelli	Powder River County District	High School	Box 481	Broadus	M.T.	59317
	Practical Software Company			Bethlehem	Pennsylvania	18017
	Prentke	Romich Company	RD2, Box 191	Shreve	Ohio	44676
	Professional Workshop		1 Fletchers Mews	MiltonKeynesBucks	England	

	Program Design Inc.		11 IDAR Court	Greenwich	Conneticut	06830
	Programs for Learning		POB 954	New Milford	Conneticut	06776
Warren Brown	Project CAISH	Gocio Elementary School	3450 Gocio Road	Sarasota	Florida	33580
Dr. M. Reddon, Director	Project on the Handicapped In Science	Suite 610	1776 Massachusetts St.	Washington	D.C.	20036
Douglas H. Williams, Ph. D.	Psycholinguistic Research Associates		2055 Sterling Avenue	Menlo Park	California	94025
	Quality Ed. Design		POB 12486	Portland	Oregon	97212
David Holladay	Raised Dot Computing		310 S. 7th Street	Lewisburb	P.A.	17837
	Random House Inc.	School Division Systems	400 Hahn Road	Westminster	Maryland	21157
Mrs. Jean Tait, Director	Redbridge Semerc	Grange Remedial Centre	Wood Path, Hainault	Ilford,Essex	England	IG6 3A7
Mary Gay Hatch	Regional Early Childhood Education Cntr.			Provo	Utah	
Marg Barker	Rehabilitation Engineering Center	Children's Hospital at Stanford	520 Willow Road	Palo Alto	California	94304
Dr. Michael Hillinger	RFD			Sharon,	VT	05065
Sandra Jackson	Robert E. Lee High School	Northeast Independent School		San Antonio	Texas	
	Rocky Mountain Software Inc.		1038 Hamilton Street	Vancouver	B.C.	
Judy Rodenstein	Rodenstein	964 Educational Services Building	1025 West Johnson Street	Madison	Wisconsin	53706
R.O. Wright	Royal Institute For the Deaf	Sc. & Tech. Department	105 Gower St.	London	England	
Ted Perry	San Juan Unified School District		3738 Walnut Avenue	Carmichael	California	95608
Carl Geigner	Schneier Communication Unit		Cerebral Palsy Centre,1603 Court St	Syracuse,	NY	13208
	Scholastic Inc.	Micro. Instruction Materials	904 Sylvan Avenue	Englewood Cliffs	N.J.	07632
	School and Home Courseware, Inc.		1341 Bulldog Lane, Suite CE	Fresno,	California	93710
	School Courseware Journal		4919 N. Millbrook #222B	Fresno	California	93726
Harry D. Stratigos	School District of Lancaster		225 West Orange Street	Lancaster	P.A.	17603
	School Microware	Dresden Associates	POB 246	Dresden	M.E.	04342
Arthur S. Gaylord	School of Chemical Sciences	University of Illinois		Urbana	Illinois	61801
Dr. P. Graystone	School of Rehab. Medicine	University of British Columbia	2194 Health Sciences Mall	Vancouver	B.C.	V6T 1W5
P. Schwelda	Schwelda		4529 Bagley Avenue N.	Seattle	Washington	98103
	Scientific and Tech. Dept. RNID		105 Gower St.	London WC1	England	
	Selected Micro. Software	Dept. E39	8950 Lurline Avenue	Chatsworth	California	91311
	SFB Products		P.O. Box 385	Wayne	Pennsylvania	19087

James W. Hunter	Shelby City Schools		23 West Main Street	Shelby	Ohio	44875
T.R. Sicoli	Sicoli		404 Darlington Dr.	West Chester	Pennsylvania	19380
	Singer Educational Div.		1345 W. Diversey Parkway	Chicago	Illinois	60614
	Smartware		2281 Cobble Stone Court	Dayton	Ohio	45431
Dr. Mike Smith	Smith		304 - 86th Avenue S.E.	Calgary	Alberta	T2H 1N7
	Society for Visual Ed.		1345 Diversey Parkway	Chicago	Illinois	60614
	Softswap/Smerc Lib.	San Mateo, Office of Ed.	333 Main Street	Redwood City	California	94063
Mr. R.E. Purser	Software Directory		POB 466	El Dorado	California	95623
	Software Micro. Center	San Mateo County Office of Ed.	333 Main Street	Redwood City	California	94063
	Southern Micro Systems for Educators		POB 1981	Burlington	N.C.	27215
Kenneth Macurik	Southside Virginia Training Centre	For the Metally Retarded		Petersburg	Virginia	
	SouthWest EdPsych Services, Inc.		Box 1870	Phoenix,	Arizona	85001
	Special Education Dept.		1600 Holloway Avenue	San Francisco	California	94132
Joanne Doell	Special Education Microcomputer Project	Paradise Valley School	P. O. Box 927	Morgan Hill	California	95037
	Spinnaker Software Corporation		215 First Street	Cambridge,	Massachusetts	02142
	SRA		155 North Wacker Drive	Chicago	Illinois	60606
	SRC-Software Research Corporation		Box 1700	Victoria,	B.C.	V8W 2Y2
	Stekatee Educational Software		4639 Spruce Street	Philadelphia	Pennsylvania	19139
	Sterling Software		1600 Fortview Road #1	Austin	Texas	78704
	Sterling Swift Publishing Company		7901 South IH-35	Austin,	Texas	78744
Robert J. Scafidel	St. Bernard Parish School Board		East Chalmette Circle at Lacoste	Chalmette	L.A.	70043
Frances Breaux	St. Martin Parish School Board		P. O. Box 217	Breaux Bridge	L.A.	70517
Donovan Pontiff	St. Mary Parish School Board		P. O. Box 550	Franklin	L.A.	70538
	Supersoft Associates		P.O. Box 1628	Champaign,	IL	61820
Ken Macurik	SVIC		Box 4110	Petersburg,	VA	23803
	Sysdata International, Inc.		7671 Old Central Avenue, N.E.	Minneapolis,	Minnesota	55432
F.M. Taber	Taber	Kalamazoo Mall	Suite 250, Plaza Building	Kalamazoo	Michegan	49007
	Tash Inc.	c/o Sunnybrook Medical Center	2075 Bayview Avenue	Toronto	Ontario	M4N 3M5
	Teach Yourself By Computer Software		40 Stuyvesant Manor	Geneseo,	New York	14454
	Teach Yourself by Computers		40 Stuyvesant Manor	Genesco	New York	14454
	Teaching Pathways, Inc.		Box 31582, 121 East 2nd Avenue	Amarillo,	Texas	79120
	Teaching Tools Micro. Services	POB 12679	Research Triangle Park		N.C.	27709
	Teaching Tools: Microcomputer Services		Box 50066	Palo Alto,	California	94303
	Teaching Tools	Micro Computer Services		Palo Alto	California	94303
	Technical Education Research Centers		3 Eliot Street	Cambridge	Massachevsits	02139

	Technical Ed. Research Center		8 Elliott St.	Cambridge	M.A.	02138
	TECK Associates		P.O. Box 8752	White Bear Lake,	Minnesota	55110
	Terrapin, Inc.		380 Green Street	Cambridge,	Massachusetts	02139
Randy W. Dipner	Tetrahedron Research Associates		3425 Valejo Court	Colorado Springs	CO	80918
	The Assoc. of Handicapped Student Serv.	Programs in Post Secondary Ed.	Box 8256, University Station	Grand Fork	N.D.	58202
	The CommuniTree Group		470 Castro Street, Suite 207-3002	San Francisco,	CA	94114
	The Conover Company		P.O. Box 155	Omro,	Wisconsin	54963
	The Continental Press, Inc.			Elizabethtown,	Pennsylvania	17022
Mr. John Grassl	The Council for Exceptional	Children	1920 Association Drive	Reston	Virginia	22091-1589
Lee Walsall	The Educational Development Center		36 Wolverhampton Rd.	Walsall		England
Raymond DuCharme	The Learning Clinic		RT. 169, P. O. Box 324	Brooklyn	Connecticut	06234
	The Learning Company		4370 Alpine Road	Portola Valley	California	94025
	The Learning Tree		45615 Van Dyke	Utica,	Michigan	48087
	The Micro Center		POB 6	Pleasantville	New York	10570
	The Psychological Corporation		757 Third Avenue	New York,	New York	10017
Mark B. Friedman	The Rehabilitation Institute	of Pittsburgh	6301 Northumberland Street	Pittsburgh	P.A.	15217
Robin L. Hight	The Universe Elecric Research Co.		339 Innisfall Drive	St. Louis	Missouri	63119
Glenn W. Morgan	Township of Ocean Schools		163 Monmouth Road	Oakhurst	New Jersey	07755
G. Vanderheiden	Trace Research & Development Center	University of Wisconsin	314 Waisman Center	Madison	Wisconsin	53706
	Turngey Software Ltd.	12 High Street	Chalfont St. Giles	Bucks		HP8 4QA
	Unique Programming Services, Inc.		Box 516	Amsterdam,	New York	12010
Mr. K. Zinn, Director	Univerity of Michigan			Ann Arbor	Michigan	48109
Dr. R. Fine	University of Alabama	Dept. of Rehabilitation Medicine	University Station	Birmingham	Alabama	35209
Lawrence R. Upjohn, Pharm, D.	University of California	Davis Medical Centre	2315 Stockton Blvd.	Sacramento	California	95817
Klaus Mewes	University of Kansas Medical Center			Kansas City	Kansas	
Shawn M. Boles	University of Oregon			Eugene	Oregon	
Bernard Fox and Mary Wilson	University of Vermont					
Mr. Gregg C. Vanderheiden	University of Wisconsin-Madison	314 Waisman Center	1500 Highland Avenue	Madison	Wisconsin	53706
	Upper Room Microcomputer Consultants		907 - 6th Avenue, East	Menomonie,	Wisconsin	54751
	Valpar International Corporation		3081 E. 34th Street, Suite 105	Tucson	Arizona	85713
	Van Nostrand Reinhold		7625 Empire Drive	Florence	Kentucky	41042
Michael Hillinger	Vermont Department of Mental Health					
Russell H. Mills	Veterans Administration Medical Centre	Ann Arbor		Ann Arbor	Michigan	
	Voice Tek		POB 388	Goleta	California	93116
	Votrax		500 Stephenson Highway	Troy	M.I.	48084
	Walshall Education Development Centre		Walsall, West Midlands		England	WS2 8PN
Mr. R. Hayden	Warboys Huntingdon		50 Buttels Road	Cambridgeshire	England	

APPENDIX B. BIBLIOGRAPHY

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APPENDIX C. GLOSSARY OF TERMS

VII. GLOSSARY OF TERMS

In the fields of microcomputers and education, terminology can easily be misinterpreted. So that everyone using the Guide will interpret words in the same way, a brief glossary is provided below. Each definition conforms to some standard use of the term but is not necessarily a composite of all uses nor the most common use.

Content	Facts, terms, ideas, concepts, principles, theories and constructs which make up the subject matter of an instructional package.
Courseware	Software and printed materials which support instruction in a complete course of study or a definite subset of a course. In this sense, it is not required that all instructional activities be supported by the package or that the tutorial mode of instruction be employed. Even a 30 minute student activity aimed at one objective can be courseware in this definition.
Documentation	Written material for the teacher to use with the computer program (also called a support booklet).
DOS	"Disk Operating System", an operating system which includes the capability of controlling and coordinating the functions of a disk drive within a computer system.
Drill & Practice Mode	A type of computer program which acts as drillmaster by providing repetitive practice on a skill or set of facts. The mode assumes that instruction in the concept skill or process has already been given. Ideally a drill and practice program should: 1) provide random selection of exercises; 2) record student progress; 3) tailor instructions,exercises and feedback to the individual; and 4) offer corrective feedback upon the input of incorrect responses.
Games	Programs in the instructional gaming mode call upon the user to apply one or more specific skills or concepts within a "game" environment. The game dimension of the environment includes the conditions of competition with self or others, specific (if arbitrary) rules, the need to develop a winning strategy and the introduction of random events to force revision of strategies. The instructional dimension of the environment demands that the development both of identifiable subject matter skills or concepts and of general problem solving skills be a goal of the exercise.
Graphics	Images displayed on a video screen or printer which are generated by a computer program.
Hardware	Equipment, including computers, disk drives, cassette players, cables and monitors.

Materials	Books, folders, envelopes, worksheets and similar items. "User Support Materials" are items which support the activity of a person using a computer program.
Microcomputer	A computer system, including peripheral hardware such as disk drive and monitor, based on a microprocessor (or "chip") and having a typewriter-like keyboard.
Package	One or more computer programs with related materials and the storage medium.
Problem Solver	A type of computer program which processes data for a student defined problem.
Program	A computer program, written in Basic, Pascal, machine code or other computer programming language. The routines and operations which instruct the computer.
Simulation	Programs in the simulation mode attempt to represent key aspects of some environment within which the user will experience the necessity of making decisions and will be informed of the results of his decisions without experiencing the real consequences of possible misjudgements. The time required to develop and use simulations is justified in situations where actual experience is ruled out due to extreme expense, safety consideration or the time required for the actual experience. Simulations include problem solving tasks (e.g. diagnosis of illnesses, genetic experiments, testing theoretical models), procedural tasks (e.g. acid titration, blasting, breeding of organisms), or performances (e.g. control of water pollution).
Software	Computer programs, including courseware, operating systems and languages.
Tutorial	For programs in this mode, the computer assumes the total responsibility for instruction. Tutorials are characterized by a dialogue between the student and the computer in which the direction and the level of the dialogue are shaped by the student's input. Ideally, tutorials should tailor and present instruction to the individual, introduce new concepts, provide exercises and tests, monitor student responses, give immediate reinforcement and corrective feedback, and keep records.

Some definitions in this glossary have been taken from Evaluator's Guide published by MicroSIFT and The Computing Teacher.

APPENDIX D. SAMPLE SURVEY FORM

DSS DECISION SUPPORT SYSTEMS LTD.

301 KINGSWAY GARDEN MALL
EDMONTON, ALBERTA T5G 3A6 • CANADA • (403) 471-5471

February 18, 1983

Dear Sir:

RE: COURSEWARE IN SPECIAL EDUCATION STUDY

DSS Decision Support Systems Ltd. on behalf of Alberta Education is conducting a study to catalogue information sources, suppliers, courseware, and courseware authors providing computer aided instruction software written or adapted for handicapped students and individuals.

Attached is a speedy questionaire requesting information covering any courseware or related hardware and software you may have. If you are willing to provide complimentary material on a preview or loan basis, then please return this material with the completed questionaire. You have our absolute assurance that we will not copy this material without your expressed permission. If you are aware of others who are authorizing software for special or exceptional education students, then please pass this on to them or advise us on how we may contact them. We would appreciate your taking the few seconds to respond to this request.

The material and questionaires gathered will be further filtered by the Computer Technology Clearinghouse. This Clearinghouse of the Department of Education of Alberta assesses courseware in co-operation with the Ministries of Education in British Columbia and Manitoba in Canada. Additionally, the evaluation reports are communicated to all schools in our province. We view this project as an extremely valuable service to our educational community. The courseware evaluated can be assured of wide exposure and those which fit our curriculum needs will be assured of high demand.

Thank you for your consideration and assistance.

Yours truly,

DECISION SUPPORT SYSTEMS LTD.

John J. Willson

JJW/sls

Enclosure

NOTE: As a measure of protection, may we suggest that instructions "not to x-ray" be placed on the exterior of the package of any electronic media material that is sent.

Courseware in Special Education Study

INSTRUCTIONS: ANSWER, (ENCLOSE MATERIAL AND SEND, OR FOLD, STAPLE, AND MAIL)

Sourcing Information

CHANGES TO LABEL? ☐

AUTHOR? ☐ VENDOR? ☐

________ ________

________ ________

________ ________

Phone ( ) ________ Phone ( ) ________

DO YOU WISH TO BE INFORMED OF SUBSEQUENT DEVELOPMENTS IN THIS AREA? ☐Y ☐N

Courseware Information

SUBJECT AREA: ________ ERIC DESCRIPTER: ________ DEWEY DECIMAL NUMBER: ________

SOFTWARE NAME: (or acronym) ________ AUTHORING DATE (or date of last revision): ________

GENERIC TYPE:
DRILL & PRACTICE ☐ SIMULATION ☐ TUTORIAL ☐
GAMING ☐ INSTRUCTIONAL MANAGEMENT ☐ OTHER ________

DESCRIPTION: ________

____

____

DOCUMENTATION:
SOURCE CODE ☐ MANUAL ☐ BROCHURE ☐ DISK ☐
BEING DEVELOPED ☐ SCHEMATICS ☐ BACK-UP ☐ COST ________
ANY ATTACHED DOCUMENTATION? ☐

VALIDATION IN USE AVAILABLE? ☐ AVERAGE COMPLETION TIME ________
RECORD KEEPING STORED ☐ INCORRECT RESPONSES ☐ RETENTION OF STUDENT PROGRESSION STORED ☐

Rehabilitation Data

HANDICAPPING SOLUTIONS FOR:
DEPENDENT H. ☐ TMH. ☐ EMH. ☐ VISUAL LEARNERS ☐ AUDIO LEARNERS ☐
KINESTHETIC LEARNERS ☐ MULTIPLE CONDITIONS ☐ OTHER ________

NORMINALIZATION CURRICULUM LEVELS:
EARLY CHILDHOOD ☐ ELEMENTARY ☐ JUNIOR HIGH SCHOOL ☐ SENIOR HIGH SCHOOL ☐
NOT APPLICABLE ☐
POPULATION AGES: 0-5 ☐ 6-12 ☐ 12 plus ☐

Computer Requirements

COMPUTER TYPE:
APPLE ☐ RADIO SHACK ☐ COMMODORE ☐ WICAT ☐ ATARI ☐
OTHER ________

MEMORY:

____

LANGUAGE:
BASIC ☐ PILOT ☐ LOGO ☐ PASCAL ☐ FORTRAN ☐ COURSE WRITER ☐
OTHER ________

OTHER SOFTWARE NEEDED? ☐ WHAT? ________

SUPPORTIVE STANDARD HARDWARE:
QWERTY REPLACEMENT ☐ PADDLES ☐ JOYSTICK ☐ COLOR GRAPHICS ☐ AUDITORY ☐
OTHER PERIPHERALS: ________

NON-STANDARD HARDWARE: ☐ PLEASE DESCRIBE ________

____

SENSORY DEVICE MODIFICATIONS: ☐ PLEASE DESCRIBE ________

____

OTHER NOTES OR QUESTIONS: ________

____

____

Thank You!

APPENDIX E. CROSS REFERENCE LIST

05-04-83

CROSS-REFERENCE LISTING

ACQ. NO.	PAGE	ID. CODE	TITLE
68	A1	AAAD	LARGE TYPE
3		AAAD	TALKING BLISSAPPLE
6		AAAM	TIM
33		AAEA	MORSE CODE CARTRIDGE
40		AAEC	
43	A2	AAEC	
69		AAEC	ACADEMICS WITH SCANNING-MATH
52		AAEC	FLORIDA SCANNER
25		AAEC	HANDI TERM
73		AAEC	JOHN'S PROGRAM
103	A3	AAEC	MATH DISK
53		AAEC	MOTOR TRAINING GAMES
197		AAEC	OPTICALLY ACTUATED KEYBOARD
125		AAEC	SCANNING PROGRAM
92		AAEC	TALK TYPER
98	A4	AAEC	TEXTTALKER
36		AAED	
204		AAED	BLIND PROGRAMMING UTILITY
82		AAED	BRAILLE
51		AAED	ELECTRONIC BLACKBOARD
198	A5	AAED	MUSICAL LANG. TERMINAL FOR THEVISUALLY IMPAIRED
205		AAED	TOTAL TALK COMPUTER TERMINAL
183		AAEM	AUTOTYPE I
126		AAEM	QUIK-TALK
26		AAMA	VISIBLE SPEECH AID
107	A6	AMDM	SINGLE SWITCH ASSESSMENT PROGRAM
72		AMEE	EIGHTYTALKER
80		AMEM	HANDI-KEYS(C)
236		AMMM	HANDI-KEYS PERSONALIZED KEYBRD
196		AMMM	ONE SWITCH INPUT SUBROUTINE
208	A7	BAAD	SIMON
32		BAAM	ANGLOPHONE
186		BAAM	COUNTER
67		BAEA	MICRO COMMUNICATOR
34		BAEA	SCOT
63	A8	BAEA	SPEAKING COMM/CONTROL DEVICE
88		BAEA	TALK II
56		BAEA	TALKING BLISSAPPLE
64		BAEA	WORDS+
70		BAEC	ACADEMICS WITH SCANNING - LANGUAGE ARTS
133	A9	BAEC	AUTOTYPE II
83		BAEC	C.U.R.T.I.S.
96		BAEC	COMMUNI-MATE
116		BAEC	COMPUTER COMMUNICATION ASSISTOR
2		BAEC	HANDI-WRITER
59	A10	BAEC	HANDICAPPED TYPEWRITER
91		BAEC	INSTA-PRINT
119		BAEC	LETTER PROCESSOR
86		BAEC	MESSAGE WRITER
105		BAEC	N.U. COMMUNICATION AND DEVICE CONTROL
118	A11	BAEC	OAKS II WORDPROCESSOR

ACQ. NO.	PAGE	ID. CODE	TITLE
60	A11	BAEC	PHONICS, TEXT, & GRAPHICS
97		BAEC	QUICK-SCAN
136		BAEC	RANDOM SQUARES
114		BAEC	SMARTTERM
94	A12	BAEC	SPEAKEASY COMM. SYSTEM
111		BAEC	SPEAKING COMMUNICATION DEVICE
109		BAEC	SUPERWRITER
112		BAEC	SYNTAX.1
93		BAEC	THE COMMUNICATION DEVICE
121	A13	BAEC	THE COMMUNICATOR
200		BAEC	THE ORATOR
78		BAEC	VERSA-SCAN
89		BAEC	WORD-COM
77		BAED	BASIC INTERPRETER FOR THE BLIND
201	A14	BAED	BRAILLE DISPLAY
199		BAED	BRAILLE WORD PROCESSING SYSTEM
75		BAED	BRAILLE-EDIT
120		BAED	DUXBURY BRAILLE TRANSLATOR
61		BAED	ED-IT TEXT EDITOR
102	A15	BAED	GRADE TWO TRANSLATOR
203		BAED	READING MACHINE FOR THE BLIND
113		BAED	TRANSLATOR
74		BAEM	ANGLOPHONE I
101		BAEM	INSTA-SPEAK
95	A16	BAEM	PICTURE-COM
122		BAEM	TAP (TYPING ASSISTANCE PROGRAM)
202		BAEM	THE B-A-R DEVICE
87		BAFC	THE COMMUNICATION AND CONTROL DEVICE
211		BMAM	TIME TUTOR
185	A17	BMEC	SQUARE SELECTOR
218		BMEC	THE MICROCOMMUNICATOR FOR THE PHYSICALLY DISABLED
127		BMEM	PROGS FOR EARLY ACQ OF LANG
104		BMEM	SAY IT
184		BMEM	SYMBOL SELECTOR
18	A18	CAAA	EAR CHALLENGER
17		CAAA	KEY-SIGNATURE DRILL
16		CAAA	KEYBOARD NOTE DRILL
4		CAAA	MATHWARE
15		CAAA	NOTE NAME DRILL
71	A19	CAAA	VOPIC
13		CAAB	
84		CAAB	SPECIAL NEEDS VOLUME 1 (SPELLING)
129		CAAC	AUTARITH I
79		CAAC	SINGLE SWITCH GAME LIBRARY
47	A20	CAAC	SPECIAL SKILL BUILDER I
320		CAAC	SPELLING FOR THE PHYSICALLY HANDICAPPED
31		CAAC	TLC
209		CAAD	BRAILLE ON TV
46		CAAD	FIRST WORDS
9	A21	CAAE	
10		CAAE	
11		CAAE	

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CROSS-REFERENCE LISTING

ACQ. NO.	PAGE	ID. CODE	TITLE
12	A21	CAAE	
14		CAAE	
231	A22	CAAM	EARLY ELEMENTARY I - SPECIAL VERSION
233		CAAM	EARLY ELEMENTARY II - SPECIAL VERSION
19		CAAM	ELEMENTS OF MATHEMATICS
20		CAAM	ELEMENTS OF MUSIC
21		CAAM	MATH LAB
137	A23	CAAM	MONEY
65		CAEA	EDIT 1 & 2, GAMES 1 & 2
188		CAMA	COMPUTER FINGERSPELLING
123		CAMA	DEAFSIGN (C)
335		CAMA	FINGERSPELLING
190	A24	CAMA	FINGERSPELLING USING A PET
187		CAMA	LIP-READER TRAINER: A PROGRAM FOR THE HEARING IMPAIRED
189		CAMM	VISUAL COMPUTER AUGMENTED TEACHING SYSTEM
81		CBAB	EDUFUN
192		CBAB	MULTISENSORY PROGRAM FOR DYSLEXIC STUDENTS
85	A25	CBAB	PRIMER 81
195		CBAB	PROGRAMS FOR COGNITIVE REHAB
333		CBAB	THE MATH MACHINE
124		CBAB	THE WORLD OF COUNTING
322		CBAM	BIKE STORY
325	A26	CBAM	DRS. ED.
191		CBFB	DRIVE TO LIVE
8		CMAB	
249		CMAC	HANDICAPPED WORD GAMES
7		CMAE	
45	A27	CMAM	
328		CMAM	
305		CMAM	1 2 3 DIGIT MULTIPLICATION
222		CMAM	2ES COURSEWARE
223		CMAM	A COMPUTER IS: - TERMS, DEVICES, SHAPES AND SIZES
302	A28	CMAM	ADDITION
296		CMAM	ADDITION AND SUBTRACTION OF WHOLE NUMBERS
303		CMAM	ADDITION WITH CARRY
273		CMAM	ADVENTURES AROUND THE WORLD
139		CMAM	ADVERTISING TECHNIQUES; PERSUASION WITH WORDS
225	A29	CMAM	ALMANAC - THE TIME MACHINE (CALENDAR & ASTRONOMY)
255		CMAM	ALPHABET SQUARES
224		CMAM	ALPHABET/KEYBOARD
260		CMAM	ALPHAKEY
226		CMAM	APPLE DIALOG - KEYBOARD TUTOR
227	A30	CMAM	ASIGNMENT SET
131		CMAM	AUTOPICT I
132		CMAM	AUTOPICT II
313		CMAM	BALLOON BANDIT
314		CMAM	BASIC ARITHMETIC
295	A31	CMAM	BEGINNING MATH CONCEPTS
254		CMAM	BEGINNING READING PACKAGE
283		CMAM	CALENDAR
140		CMAM	CALENDAR SKILLS
141		CMAM	CHANGE MAKING

CROSS-REFERENCE LISTING

05-04-83

ACQ. NO.	PAGE	ID. CODE	TITLE
247	A32	CMAM	CHILDREN'S CAROUSEL
142		CMAM	CLOCK
143		CMAM	CLOCK
144		CMAM	COLOR GUESS
42		CMAM	COMCAL
145	A33	CMAM	COMPARATIVE BUYING
243		CMAM	COMPUTER ANIMATED READING INSTRUCTIONAL SYSTEM
278		CMAM	COMPUTERIZED READING MACHINE
267		CMAM	CONSONANTS
146		CMAM	CONTEMPORARY LIVING
294	A34	CMAM	COUNT 'EM
293		CMAM	COUNT AND ADD
290		CMAM	COUNTING
292		CMAM	COUNTING BEE
147		CMAM	DIRECTION AND DISTANCE
316	A35	CMAM	DIVISION
148		CMAM	DOLLAR AND CHANGE
149		CMAM	DRESSING
230		CMAM	EARLY ELEMENTARY I
232		CMAM	EARLY ELEMENTARY II
245	A36	CMAM	EARLY GAMES
244		CMAM	EARLY LEARNING PACKAGE
50		CMAM	EARLY WORDS
238		CMAM	FAMILY FUN
216		CMAM	FIRST AID AND SAFETY
130	A37	CMAM	FOX AND GEESE
270		CMAM	GAME POWER FOR PHONICS
154		CMAM	GERTRUDE'S PUZZLES
155		CMAM	GERTRUDE'S SECRETS
156		CMAM	GOOD HEALTH HABITS
157	A38	CMAM	GRADUATED CYLINDER
27		CMAM	HARTLEY: MULTIPLE SKILLS
158		CMAM	HICKORY DICKORY
246		CMAM	HODGE PODGE
242		CMAM	INTELLIGENT VIDEODISC FOR SPECIAL ED. TECHNOLOGY
291	A39	CMAM	INTRODUCTION TO MATHEMATICS ONTHE COMPUTER
162		CMAM	JUGGLES' RAINBOW
259		CMAM	K-1 LANGUAGE PACKAGE
286		CMAM	K-1 MATHEMATICS PACKAGE
49		CMAM	KIDSTUFF & TURTLE TRACKS
215	A40	CMAM	LEARNING & PRACTICING WITH MONEY #50
248		CMAM	LETTER PROGRAMS
262		CMAM	LETTER RECOGNITION
281		CMAM	LIFESKILL READING SERIES I
282		CMAM	LIFESKILL READING SERIES II
306	A41	CMAM	LONG DIVISION
164		CMAM	MAP READING
165		CMAM	MARKET SURVEY
261		CMAM	MATCH IT
258		CMAM	MATCHING CAPITAL LETTERS, SMALL WITH CAPITALS
166	A42	CMAM	MATH - MONEY
167		CMAM	MATH - TELLING TIME

ACQ. NO.	PAGE	ID. CODE	TITLE
298	A42	CMAM	MATH BID
318		CMAM	MATH FOR EVERYDAY LIVING
317		CMAM	MATH FOR THE YOUNG CONSUMER
41	A43	CMAM	MATH INVADERS
337		CMAM	MATH LAB
38		CMAM	MATH MACHINE
312		CMAM	MATH PACKAGE
289		CMAM	MATH'S FOR FUN
39	A44	CMAM	MCE
193		CMAM	MICROCOMPUTER BASED VERBAL EXCHANGE FOR THE HANDICAPPED
250		CMAM	MICROCOSM I
251		CMAM	MICROCOSM II
300		CMAM	MONEY MASTER
170	A45	CMAM	MONEY! MONEY!
297		CMAM	MORE THAN TEN
315		CMAM	MULTIPLICATION
138		CMAM	NAME JUMBLE AND WHAT NAME
287		CMAM	NUMBER LINE PACKAGE
229	A46	CMAM	NURSERY TIME
271		CMAM	OUR WEIRD AND WACKY WORLD- LITERAL COMPREHENSION
272		CMAM	OUR WEIRD AND WACKY WORLD- CRITICAL READING PROGRAM
277		CMAM	OUR WILD AND CRAZY WORLD
275		CMAM	PAL
171	A47	CMAM	PERSONAL CONSUMERISM
172		CMAM	PERSONAL FINANCE
135		CMAM	PICTURE COUNTING
237		CMAM	PRESCHOOL IQ BUILDER
285		CMAM	PRESCHOOL MATH PACKAGE
128	A48	CMAM	RACE 2
279		CMAM	READING COMPREHENSION III
280		CMAM	READING COMPREHENSION IV
174		CMAM	ROCKY'S BOOTS
214		CMAM	SCRAMBLED LETTERS AND FLASH SPELLING
288	A49	CMAM	SHAPE PACKAGE
134		CMAM	SHAPES
252		CMAM	SPACE WASTE RACE
257		CMAM	SPELLING BEE WITH READING PRIMER
274		CMAM	STRANGE ENCOUNTERS: YOU DECIDE
304	A50	CMAM	SUBTRACTION
175		CMAM	SURVIVAL MATH
299		CMAM	TELLING TIME
176		CMAM	TELLING TIME COMPUTER SET
323		CMAM	TENNIS ANYONE
253	A51	CMAM	THE PEAR TREE
269		CMAM	THE READING MACHINE
265		CMAM	THE VOWELS TUTORIAL
319		CMAM	THEIR WORLD
212		CMAM	TIC TAC TOE - HARD & SOFT C
213	A52	CMAM	TIC TAC TOE - HARD & SOFT G
177		CMAM	TIME MASTER
110		CMAM	TUTOMATH
178		CMAM	U.S. TIME ZONES

CROSS-REFERENCE LISTING

ACQ. NO.	PAGE	ID. CODE	TITLE
179	A52	CMAM	USING A CALENDAR
217	A53	CMAM	USING A CALENDAR - GRADES 2 TO4
180		CMAM	USING MONEY AND MAKING CHANGE
266		CMAM	VOWELS
268		CMAM	VOWELS
264		CMAM	WHO, WHAT, WHERE, WHEN, WHY
35	A54	CMAM	WINDOWS TO READING
263		CMAM	WORD FAMILIES
219		CMAM	WORD WISE BASAL 1
220		CMAM	WORD WISE BASAL 2
228		CMAM	WORD WISE BASAL 3
181	A55	CMAM	WORK SERIES
256		CMAM	WORKING WITH THE ALPHABET
182		CMAM	YOU CAN BANK ON IT
321		CMFM	BUS STORY
284		CMFM	DRIVER EDUCATION
150	A56	CMFM	DRIVER EDUCATION SET
151		CMFM	DRIVER'S AID
152		CMFM	DRIVER'S EDUCATION/INDUSTRIAL ARTS - VOLUME 1
153		CMFM	ELEMENTARY - VOLUME 13
159		CMFM	HOME SAFE HOME
160	A57	CMFM	INCOME MEETS EXPENSES
161		CMFM	JOB READINESS-ASSESSMENT AND DEVELOPMENT
163		CMFM	LIFE CHALLENGES
168		CMFM	MEMORY MYTH
173		CMFM	POISON PROOF YOUR HOME
44	A58	CMMM	LOVE
55		DADA	THE EVALUATION SYSTEM
57		DAEA	VOCALIZATION TRAINER
330		DMBM	APPLIED BEHAVIOR ANALYSIS
332		DMBM	SPECIAL EDUCATION INTERACTIVE TUTORIALS
331	A59	DMBM	SPECIAL EDUCATION GROWTH AND DEVELOPMENT TUTORIAL
37		DMCM	
30		DMCM	ADMINISTRATIVE PLANNING SYSTEM
23		DMCM	B.O.P.
29		DMCM	CURRICULUM MANAGEMENT SYSTEM
334	A60	DMCM	INDIVIDUAL STUDY CENTER
28		DMCM	INDIVIDUALIZED PLANNING SYSTEM
336		DMCM	INFORMATION MANAGEMENT FOR SPECIAL EDUCATION
241		DMCM	MODULARIZED STUDENT MGMT SYS
22		DMCM	PROJECT IEP
329	A61	DMDM	COMP.O.S.E.
311		DMDM	COMPLETE DIAGNOSTIC PRE-TEST SYSTEM FOR ARITHMETIC
169		DMDM	MONEY MANAGEMENT ASSESSMENT
276		DMDM	THE PLACEMENT TEST
76		EAAC	DOTS AND DRAW
100	A62	EAEC	EZBAS
54		EAEC	MOTOR-HANDICAPPED SUPPORT SYSTEM
115		EAEC	SPECIAL EDITOR
108		EAMM	SPECIAL INPUTS DISK
221		EMCM	2ES EDUCATIONAL SYSTEM
207	A63	EMCM	BUS ROUTE PLANNING PACKAGE

ACQ. NO.	PAGE	ID. CODE	TITLE
240	A63	EMCM	SP ED READ/SP ED MATH
117		EMDM	COGREHAB
210		EMEM	
99		EMEM	COMMUNITREE-FIRST EDITION
324	A64	EMEM	HANDI-KEYS
326		EMEM	PEACHY WRITER-BOLD
106		EMFM	REJOB
1		EMME	INTEGER FIX
48		EMMM	
90	A65	EMMM	EXTEND
58		MAEA	SAYIT (TN) FOR TYPE-N-TALK (TN)
62		MBAB	VAKT '80
310		MMMM	DIVISION
307		MMMM	MICROTUTOR II - ADDITION
309	A66	MMMM	MULTIPLICATION
308		MMMM	SUBTRACTION
24		MMMM	TYPEMASTER, LEARNING BOX, ALPHABETIZE, DIVISION

APPENDIX F

REVIEW OF RESEARCH

Research on the Matching of Learner Modalities and Cognitive Styles to Instructional Strategies: Implications for CAI in Special Education

Stewart J.H. McCann, Ph.D.

March, 1983

Abstract

Empirical studies on the matching of learner modalities and cognitive styles to instructional strategies are reviewed. Of 36 investigations of the interaction of visual and auditory learner strengths and visual and auditory instruction to educational outcomes, only five offer any evidence for the validity of the model. It is concluded that the modality matching model at this time lacks empirical justification. The results of 17 studies on the interaction of field independence-dependence and teaching approaches suggest that field independent students are hindered while field dependent students are helped by external structuring, that feedback showing the proper solution is helpful to field-dependent students, that field independent students use more hypothesis testing in their learning approach, that learning differences in favor of field independent students under conditions of intrinsic motivation can be equalized with external rewards, that field independence-dependence does not interact with lecture versus CAI, and that computer programming aptitudes are not related to field independence-dependence. Eight studies on the interaction of learner conceptual level and instructional structure provide limited and inconsistent evidence that high conceptual level students are hindered while low conceptual level students are helped by external structuring. Implications for CAI in special education are stated.

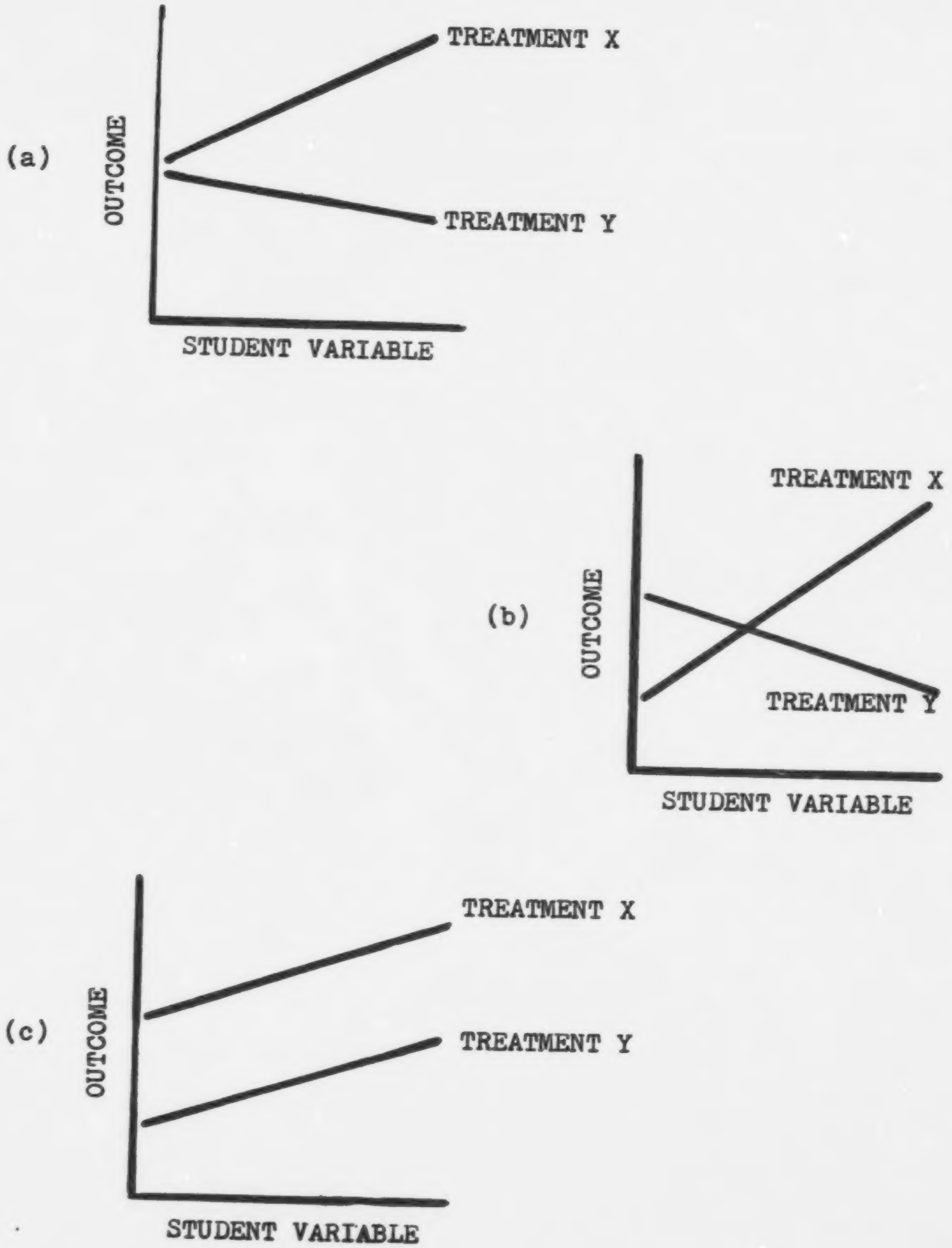
Research on the Matching of Learner Modalities and Cognitive Styles to Instructional Strategies: Implications for CAI in Special Education

Over the past four decades there has been an increasing interest in attempting to improve instruction by providing for individual student differences. This theme pervades not only instructional psychology but the whole area of contemporary educational thought. Matching students with instructional practices conducive to higher levels of achievement is in line with the liberal ideal of a formal education system which is ultimately individualized for each student and gives each student the optimal opportunity to perform to the utmost of his or her potential.

Impetus was given to this philosophy by Cronbach (1957) in his APA Presidential Address when he forcefully argued that the experimental and correlational strategies in psychological theory and research should be united to form an interactional approach. From this came what is commonly referred to as the Aptitude x Treatment Interaction (ATI) paradigm. ATI research is an endeavour to look at educational outcomes in terms of the variance-accounting capacities of the interactions of intructional and student variables. ATI research is an orientation, rather than an area, within the bounds of instructional psychology and classroom dynamics (Berliner & Cahen, 1973) The ATI approach recognizes that the combined effect of an educational treatment, either teacher based or instruction based, and a student variable may contribute to the variance in the dependent variable in a multiplicative fashion. There may indeed be educational treatments which have systematic effects on educational results but the treatments may effect different students in dissimilar and even contrary ways. Misleading conclusions may be drawn that certain teacher or instructional variables have little influence upon the educational outcome being considered unless pupil variables are analyzed in concert with teacher or instructional variables.

"Interaction" is a statistical term meaning that treatments of a study have significantlv uneven and perhaps contrasting effects on different subgroups of subjects. Lubin (1961) has discussed two types of interaction effects. In the "ordinal" case the rank order of the treatments is constant across all levels of the subject variable. For example, Treatment X is superior to Treatment Y at all sample levels of a student variable but Treatment X is vastly superior to Treatment Y at the higher levels of the student variable and only marginally superior to Treatment Y at the lower levels of the student variable. In the "disordinal" case the rank order of the treatments is different for different levels of the subject variable. For example, Treatment X is superior to Treatment Y at high levels of a student variable but Treatment Y is superior to Treatment X at low levels of the student variable. A cautious interpretation of main effects can be made when a significant ordinal interaction is found if one restricts the explanation to the ranges of the variables represented in the study. However, the significance of main effects may be

Examples of (a) an Ordinal Interaction, (b) a Disordinal Interaction, and (c) No Interaction



entirely meaningless if a significant disordinal interaction exists. Both ordinal and disordinal interactions are important in ATI research (Cronbach & Snow, 1977, p. 495) and for making educational decisions (Berliner & Cahen, 1973).

For the purposes of illustration, consider two examples of interaction within the instructional context. A disordinal interaction was found by McCann and Fisher (1977) involving student dogmatism and perceived teacher directiveness in relation to student satisfaction with the teacher. The more nondirective the teacher was perceived to be, the more satisfied were the nondogmatic students and the less satisfied were the dogmatic students. Tuckman (1968) reported an ordinal interaction. Cognitively complex students were more satisfied with and tended to earn higher grades from nondirective teachers as opposed to directive teachers, whereas the less cognitively complex students reacted similarly to the two styles.

It has been emphasized by several writers that instruction simply cannot be meaningfully individualized without some underlying notion of ATI and that aptitude or attribute information is of no use in individualizing instruction unless there is an ATI effect (Cronbach, 1967). Clearly, "all attempts at individualizing instruction rest explicitly or implicitly on hypothesized ATI" (Snow, 1976, p. 54). Individualized instruction can be thought of as the practical utilization of principles derived from empirical inquiry under the ATI rubric (Rhetts, 1972)

In special education a particular model for individualizing instruction, referred to as the Differential Diagnosis-

Prescriptive Teaching (DD-PT) model by Arter and Jenkins (1979), has been dominant in recent years. According to the DD-PT model, failure to profit from the usual academic experiences is assumed to be the result of improvements in the functioning of one or more sensory or cognitive processes. Children with learning difficulties are assessed with one or more psychometric instruments and on the basis of test results instructional prescriptions are formulated. Instruction may be designed to capitalize upon the student's strengths and to avoid weaknesses or it may be designed to improve functioning in the area of sensory and cognitive processing deficiency. The outcome variable of interest in the first approach is still performance in some academic area such as reading or mathematics. In the second approach the immediate outcome variable of interest is improvement in the deficient sensory or cognitive processing capacity and performance in the academic sphere is only a more distant and indirect outcome variable of interest.

It is the first approach which is relevant to the focus of the present paper. This DD-PT approach is clearly similar to the conventional ATI paradign. Empirical support for this DD-PT model can only be ascertained by studies which take the ATI research strategy. Students with and without the specific sensory or cognitive processing abilities in question must be exposed to instructional treatments which do and do not attempt to capitalize on learner strengths and avoid learner weaknesses. Only if there is a significant interaction between the learner variable and the instructional variable in relation to some educational variable of interest can the soundness of the particular DD-PT approach be accepted. In other words, it must be shown that instruction matched to the student's pattern of strengths and weaknesses is more effective in influencing an educational outcome variable than is instruction not matched to the student's pattern of strengths and weaknesses.

The drive toward the individualizing of instruction has been spurred by the recent advances in microelectronics which have culminated in the advent of the microcomputer. The microcomputer provides a vehicle for computer assisted instruction (CAI) to be used on a widespread basis. Not surprisingly, in special education where the attempt to individualize instruction is the norm, there is lively enthusiasm and optimism surrounding the conversion to microcomputers (e.g., DeBonis, Joseph, & Prezioso, 1982; Grimes, 1981; Hannaford & Sloane, 1981; Harselbring, 1982; Taber, 1981).

Through the microcomputer, each student can receive information at his own speed and with proper branching built into the software the student can also receive the information at the appropriate conceptual and reading level, but as Taber (1981, p. 3) points out, "little software is available at present that has been programmed to individualize to the needs of particular learners." If CAI with microcomputers is to have a broad practical impact in special education and be compatible with current principles in special education, one necessary step might be to develop software for use in the ATI DD-PT approach which is employed on such a widespread basis.

The purpose of the present paper is to review the literature which examines the interaction of two catagories of student variables--learning modalities and cognitive styles--with variations in instructional strategies in order to determine the potential implications for the design of CAI software for use with microcomputers in special education.

Learner Modality and Instructional Mode

The underlying principles of the modality matching model are rather straightforward. Special educators often assume that children who have difficulty learning in school may have weaknesses in one or more sensory modalities, usually the auditory or visual modality, which impede the processing of information. A deficit in the auditory modality interferes with the learning of material presented auditorily while a deficit in the visual modality interferes with the learning of material presented visually. From the perspective of a special educator, two different approaches to instruction may be taken: (1) the child with a modality deficit can receive instruction primarily through the stronger modality thereby circumventing the deficient modality, or (2) the child with a modality deficit can profit from educational and therapeutic experiences designed to strengthen the functioning of that modality. Writers such as Wepman (1967), Lerner (1971), Johnson and Myklebust (1967), and Gearheart (1973) have been influential in regard to the first approach while writers such as Kephart (1960) and Frostig and Horne (1964) have promoted the second approach. Within the context of the present paper, however, only the first approach is of interest.

Relatively few studies furnishing information on which to judge the efficacy of matching auditory and visual instructional treatments to the preferred perceptual modalities of students have employed exceptional children as subjects. Of these studies, Meyers (1980), Sabatino and Dorfman (1974), Sabatino, Ysseldyke, and Woolston (1973), Sabatino and Streissguth (1972), Sabatino and Ysseldyke (1972), and Tyler (1974) found no support for the modality matching model. Some evidence for the model has been put forth by Lilly and Kelleher (1973) and Cunningham (1978). Wheeler (1973) and Waters (1973) also used samples of exceptional children but their results appear to be uninterpretable in regard to the matching issue.

Meyers (1980) assessed the modality strengths of 72 learning disabled elementary school students on the auditory and visual subtests of the Illinois Test of Psycholinguistic Abilities (ITPA). Students were sorted into those with auditory strengths, those with visual strengths, and those showing deficits and strengths on both the auditory and visual subtests and were randomly assigned to either a visual, an auditory, or a multisensory (auditory, visual, kinesthetic) instructional group. The experimental task was the learning of ten unfamiliar words. There were two criterion variables: (1) to pronounce the word correctly directly following the teaching sequence, and (2) to pronounce the word correctly one day later. No interactions between learner strength and teaching approach were found.

Sabatino and Dorfman (1974) explored the reading achievement gains made by 77 educable mentally retarded pupils aged 7 years to 13 years-1 month when reading instructions was geared to their dominant perceptual modalities. Visual perception was assessed with the Developmental Test of Visual-Motor Integration (Beery & Buktenica, 1967) and auditory perception was measured with the Auditory Recognition subtest of the Test of Auditory Perception (Sabatino, 1969). The visual curriculum was the Sullivan Programmed Reading Series (Buchanan & Sullivan, 1968) and the auditory curriculum was the Direct Instructional System for the Teaching of Arithmetic and Reading (DISTAR), Reading I (Englemann & Bruner, 1971). Each of the two instructional groups contained approximately equal numbers of visile, audile, and nonpreference learners. There were 36 pupils in the visual treatment group and 41 pupils in the auditory treatment group. The instructional groups each were taught one-half hour per day for 12 weeks. Achievement gains were assessed on reading recognition and spelling subtest scores of the Peabody Individualized Achievement Test (PIAT) (Dunn & Markwardt, 1970) and on a criterion referenced word recognition test specifically designed for the purpose by Sabatino and Dorfman. Results showed that visual learners did not achieve greater gains under a visual teaching method and auditory learners did not achieve greater gains under an auditory teaching method. There was no interaction between learner modality and instructional treatment.

Sabatino, Ysseldyke, and Woolston (1973) also attempted to determine the extent to which the reading achievement of educable mentally retarded children could be heightened when an auditory or a visual perceptual curriculum was matched to the stronger of the learner modalities. From an initial sample of 106 children, 36 visiles and 36 audiles were selected on the basis of the difference between their scores on the Bender Visual Motor Gestalt test and the Test of Auditory Perception. The visiles and audiles were randomly assigned to three groups each consisting of 12 visiles and 12 audiles. The study was carried out in two 10-week phases. In the first phase, Group A and Group B (a Hawthorne group) received auditory instruction in a resource room for one-half hour per day; in the second phase Group C and Group B received visual instruction in a resource room for one half-hour per day. There were no significant interactions between learners' perceptual strengths and the two instructional treatments in terms of reading achievement. Two other similar studies by Sabatino and Ysseldyke (1972) and Sabatino and Streissguth (1972) also failed to provide any support for the interactional hypothesis.

Tyler (1974) tested the modality matching hypothesis in the context of a short-term laboratory experiment in which each pupil received individual instruction. Of a total of 112 children involved in classes for the mildly retarded screened on a battery of four auditory and four visual tests, 22 who exhibited the largest positive discrepancy between their auditory and visual composites were designated as audiles and 22 who showed the largest negative discrepancy between their auditory and visual composites were classified as visiles. The audiles and the visiles were randomly placed into experimental groups and were individually taught a number of unknown nonsense syllables for a 30-minute session emphasizing either a phonic (auditory) or a whole-word-look-say approach. With number of words correct following the training session as the dependent variable, the results failed to support the prediction that the children would learn more when taught to their strongest modality.

Lilly and Kelleher (1973) developed their own tests of visual memory and auditory memory and screened 57 educationally handicapped students ranging in age from 8 years-1 month to 12 years-2 months and in IQ from 80 to 129. Two extreme groups of 11 pupils were classified as either audiles or visiles and were presented individually with both a taped and a typewritten story. The two stories were different but were the same length and each contained 28 facts. The mode of presentation was alternated so that an equal number of pupils received the auditory and the visual story first. The number of facts recalled from each story served as the dependent variable. There was a significant disordinal interaction between pupil modality strength and mode of presentation. Visiles performed better on typed stories and audiles were superior on taped stories. The differences between audiles and visiles were somewhat more pronounced on the visual story than on the auditory story.

Cunningham (1978) screened a sample of 7 to 9 year old boys and girls which included both learning disabled and normal children with an auditory test (Lindamood & Lindamood, 1971) and a visual test (Beery, 1967). Those high on the auditory test and low on the visual test were classed as auditory; those high on the visual test and low on the auditory test were classed as visual. The 44 subjects were exposed to an experimental task learning paired-associates having pairs that were nonmeaningful auditory and visual stimuli. With the number correct over ten trials as the criterion, the auditory pupils were superior on auditory paired-associates while the visual pupils outperformed the auditory pupils on visual paired-associates. However, both groups scored very much higher on the visual than on the auditory paired-associates and Cunningham concluded that "only the visual group's performance confirmed that learning is more effective when the material corresponds to the strongest perceptual modality" (p. 1200).

The stated purpose of a study by Wheeler (1980) was "to determine whether students with learning problems could increase their own reading efficiency by learning through resources that complemented their perceptual strengths" (p. 60). Sixteen second-grade learning disability students with a history of reading failure were assessed with "informal diagnostic tests" and seven were classified as visiles, four as audiles, and five as weak in both visual and auditory modalities. For 25 minutes per day for three weeks audiles were given auditory instruction, visiles were given visual instruction, and those low in both modalities were given tactile instruction. In a pretest posttest analysis, those students receiving the tactile approach seem to have been marginally superior to those receiving the visual and auditory treatments but no significance tests were calculated. Also, "the students were permitted to use the same instructional approaches as the other two groups to supplement their learning. For example, a student who had visual and auditory problems had new words presented, using a tactile approach" (p. 62). Therefore, from a research standpoint the study remains uninterpretable if any rigor is to be allowed.

According to Kampwirth and Bates (1980), Waters (1973) "found that the matching of instructional reading approaches to third graders' perceptual strengths resulted in greater reading achievement scores than did the opposite procedure" (p. 599). Presumably working from the same source as Kampwirth and Bates, the present author is unable to deduce such a clear conclusion. No analysis or statistics are presented in the Waters report. Only a summary of conclusions and recommendations is provided:

> Favoring one mode of learning above another mode is of lesser importance than utilizing the mode which meets the individual needs of children at a particular time and in a given situation.... It is imperative for the classroom teacher to individually prescribe proper activities and exercises which tend to elicit optimal performance from each child through the utilization of his strongest channel of learning as attempts are made to ameliorate various aspects of the weakest mode of learning.... The utilization of a combination of modalities where needed should result in the greatest recall of words.... The reading teacher should begin instruction through use of exercises and activities which tend to encourage use of the preferred mode of learning for a given child. Concurrently, exercises should be provided which will strengthen the weakest channel of learning. (pp. 3413A - 3414A)

On the basis of these statements, coupled with the absence of statistical data, it does not seem wise to endorse the conclusion of Kampwirth and Bates.

Most investigators of the modality matching hypothesis have been carried out with children not classified as exceptional. Twenty-five studies in this category have been located which offer no support for the interaction effects of learner modalities and instructional approaches (Bateman, 1967; Bates, 1975; Bruininks, 1968; Cripe, 1966; Denison, 1971; Dequin, 1972; Freer, 1972; Gallistel, Curran, & Hawthorne, 1972; Gilberg, 1973; Harris, 1965; Huebner, 1969; Janssen, 1973; Jones & Aaron, 1971; Kampwirth, 1979; Miller, 1974; Newcomer & Goodman, 1975; Ringler, Smith, & Cullinan, 1971; Robinson, 1972; Schleif, 1970; Serapiglia, 1973; Smith, 1971; Vandever & Neville, 1974; Warren, 1973; Waugh, 1973).

Bateman (1968) assigned children to four first-grade classes on the basis of their scores on the visual and auditory sequential memory subtests of the ITPA. Two of the classes contained high visual learners; the other two classes contained high auditory learners. One class of visual learners and one class of auditory learners were taught reading with an auditory approach and one class of visual learners and one class of auditory learners were taught reading with a visual approach. Four other classes contained students who were not assigned on the basis of ITPA scores. In all, 182 children participated in the experiment. After nine months of instruction there was no evidence that learner modality interacted with instructional treatment in relation to reading achievement scores.

Freer (1972) conducted a similar study. From a total of 160 first-graders, 27 visiles and 32 audiles were identified with a battery of three visual and three auditory tests. All students were randomly assigned to classes which emphasized either a visual or an auditory reading program. Scores on the Botel Word Recognition Test administered after four months of instruction provided no evidence of an interaction between learner modality preference and teaching strategy.

Another large-scale long-term study was carried out by Robinson (1972). Visual and auditory preferences were determined for 448 first-grade pupils with group visual-perceptual tests constructed by Goins (1958) and with the individually administered Wepman Auditory Discrimination Test. Pupils were assigned to 22 classrooms and received either an auditory or a visual reading curriculum. Reading achievement was guaged at the end of the first, second, and third years of schooling. No differences in reading performance could be attributed to the interaction of modality preference and reading curriculum.

Gallistel, Curran, and Hawthorne (1972) subjected 58 first-graders to a sight-word reading approach for four months followed by a phonic approach for four months. Two word recognition tests were given after each approach. Correlations between achievement scores and auditory and visual aptitudes, as assessed with five auditory and five visual perceptual tests, did not give any evidence for the modality matching assumption.

Miller (1974) also performed a direct test of the modality matching hypothesis with two classes of first-graders. One classroom used a phonics approach while the other classroom used a whole-word approach. Modality preference was measured with a battery of tests at the beginning of the year. Correlation coefficients between modality preference and reading achievement did not differ in the two classrooms at the end of the year.

Vandever and Neville (1974) screened each of the 282 pupils in second grade at one school by teaching each one to recognize twelve different words by auditory, visual, or kinesthetic methods. Seventy-two children who learned significantly more or significantly fewer words under one method as opposed to the other two methods were classified as having auditory strength, auditory weakness, visual strength, visual weakness, kinesthetic strength, and kinesthetic weakness. Auditory strength and auditory weakness pupils were assigned to classes in which a visual instructional approach was used. Similarly, pupils showing visual strength or visual weakness were assigned to visual programs and pupils with kinesthetic strength or kinesthetic weakness were taught in a kinesthetic fashion. No differences in reading achievement were observed after a six-week period between those students taught to their strengths and those taught to their weaknesses.

Huebner (1969) identified students in 32 second-grade classes who showed a preference for either their visual or auditory modality and randomly assigned eight of the classes to one of four treatments: auditory instruction and auditory achievement test, auditory instruction and visual achievement test, visual instruction and visual achievement test, and visual instruction and auditory achievement test. Analysis of reading achievement scores showed that there was no interaction between modality preference and mode of instruction or between modality preference and mode of testing.

Other researchers too have found no support for the interactive model in studies which have employed actual teaching over an extended period of time. Smith (1971) compared the reading achievement of extreme audiles, extreme visiles, and intermediate members of a control group after exposure to one of three reading programs for two years. The programs stressed auditory, visual, or combined strategies. No interaction effects were found. Similarly, Kampwirth (1979) in two investigations, Jones and Aaron (1971), and Warren (1973) each reported that students performed no better on achievement tests when instruction was matched to their perceptual strengths or weaknesses.

Investigations of the modality matching hypothesis using short-term laboratory experiment approaches have also been largely unsuccessful. Bruininks (1968) selected 20 students with auditory dominance and 20 with visual dominance from an initial sample of 105 male second and third-graders on the basis of their scores on six auditory and six visual tests. Subjects were individually taught 15 previously unknown words by either an auditory or a visual approach for approximately 20 minutes and were given an immediate recall test. One week later, students were given a delayed recall test on the first list of words, taught another list of previously unknown words by the alternate approach, and given an immediate recall test. One week later they were also given a delayed recall test on the second list of words. The order of the teaching approaches was randomized but both orders were represented equally across auditory learners and visual learners. No interactions between modality dominance and teaching approach were found.

In a very similar study, Bates (1975) indentified 15 visiles and 15 audiles from a sample of 46 first graders. Following the same format as Bruininks, she taught ten unknown words to each of the children with an auditory or a visual approach and one week later taught another ten unknown words with the alternate approach. After each teaching session, a recall test was given and after one week a delayed recall test was administered. She also found no interaction between modality preference and teaching method either on the immediate recall test or on the delayed recall test.

Newcomer and Goodman (1975) felt that one reason for the failure of previous researchers in the area to demonstrate aptitude x treatment interaction effects may have been that they had employed inadequate criteria for establishing modality preferences. To improve assessment procedures they decided to use 28 auditory and visual perceptual tests including the ITPA. From a total sample of 167 fourth-graders, Newcomer and Goodman classified 16 as high auditory learners, 16 as low auditory learners, 11 as high visual learners, and 14 as low visual learners. All 57 pupils were randomly assigned to eight small instructional groups. Each group was instructed independently. An associative learning task and a meaningful learning task were employed with each group on separate occasions. The association learning task and the meaningful learning task consisted of visual and auditory versions. In each case, the order of the versions was altered. Results showed no evidence of interaction effects on tests of recognition.

Waugh (1973) used an extremely stringent classification method to select eight audiles and nine visiles from a sample of 166 second-grade children. The audiles had a mean on the auditory subtests of the ITPA at least two standard deviations above their mean on the visual subtests. The visiles had a mean on the visual subtests which was at least one and one-third standard deviations above their auditory mean. There were two phases in the study and all 166 second-graders participated. Both phases were conducted in the pupils' regular classrooms. In the first phase, ten words were presented either in an auditory or a visual mode three times each at one-second intervals. Students had to select those ten words which had been presented from a list which also contained ten distractors. Students then repeated the task with ten different words and the alternate presentation mode. The presentation modes were counterbalanced across the entire sample of classrooms. In the second phase, ten words were taught with a visual procedure and ten words were taught with the auditory procedure. Students were then asked to select these words from a multiple choice test format. Data were analyzed separately for each phase. No support was gained for the matching of instructional and learner modalities.

Ringler, Smith, and Cullinan (1971) separated 128 first-grade pupils into those whose strength was in the auditory, visual, or kinesthetic modality. Five instructional treatment groups were created: auditory instruction, visual instruction, kinesthetic instruction, auditory-visual-kinesthetic instruction, and a control group. Pupils were randomly assigned to the groups and each of the four experimental groups received 7½ hours of reading instruction. Those pupils receiving instruction matched to their modality strength did not perform at a higher level on a word recognition test than those receiving instruction which was not matched to their modality strength.

Denison (1971) selected 14 visiles and 14 audiles from a sample of 89 first-graders on the basis of their performance on four perceptual tests. Members of each group were taught one list of eight pairs of nouns visually as pictures projected on a screen and another list of eight pairs of nouns by audio tape. The order of presentation was counterbalanced. The criterion was the number of correct answers over 12 learning trials for each list. There was no significant interaction between perceptual dominance and method of presentation.

Schleif (1970) explored the question of whether any relationships existed among teaching mode, learner modality, and the acquisition of a written vocabulary for post-kindergarten pupils in a summer readiness program. Thirty audiles, 30 visiles and 30 students who demonstrated a kinesthetic preference were randomly assigned to three treatment groups to be taught by an auditory, visual, or kinesthetic approach. The words "baby, girl, lift, said, over, upon, this, some" were taught during two half-hour sessions on consecutive days. Achievement was measured with an immediate learning test after the second session and with a delayed retention test 24 hours later. No significant interactions occured between learner modality and teaching method.

Gilberg (1973) catagorized 517 students in first, second, and third-grade as auditory (N = 144), visual (N = 160), high auditory-high visual (N = 151) and low auditory-low visual (N = 62). There were three instructional modes: auditory, visual, and audiovisual. Thirty words on audiotape comprised the auditory instruction. Thirty simple black and white pictures or slides corresponding to the thirty words served as the visual instruction. The audiotape and the slides were presented together for the audiovisual instruction. Classes were randomly assigned to the three treatments and a recognition test was given directly afterwards. Students were required to select the ten items which had been presented from a list containing five distractors. There was no interaction between learner modality and instructional treatment.

In the remaining studies in this category, Serapiglia (1973) also failed to establish significant interactions between learner modality and teaching mode on word recognition tests with primary school children, Cripe (1966) found that visual and auditory preferred modality subjects learned visual and auditory tasks equally well, and Janssen (1972) found that visual and auditory aptitudes did not interact with visual or auditory methods of word recognition training in a sample of kindergarten children. In somewhat tangentially related research, Harris (1965) reported that auditory and kinesthetic perceptual strengths did not interact with auditory and kinesthetic teaching strategies in a sample of first-grade low visual scorers, and Dequin (1972) showed that in a sample of high school students, listening and reading ability and preference and instruction based on audio and reading were not interactively related to achievement.

Support for the channel matching hypothesis has been found by Daniel and Tacker (1974), Foster, Reese, Schmidt, and Ohrtman (1976), and Bursuk (1971) Daniel and Tacker (1974) administered four subtests from the Illinois Test of Psycholinguistic Abilities (ITPA) and four subtests of the Detroit Tests of Learning Aptitude (DTLA) to 105 children seven and eight years old enrolled in a laboratory school. Based on disparities between composite visual and auditory scores, 15 subjects were designated as visual, 15 as auditory, and 15 as no preference. Sixteen trigrams were randomly selected from the Glaze and Kreuger Scales (Underwood & Schultz, 1960) and randomly assigned to either an auditory list or a visual list. Audio trigrams were presented on tape and visual trigrams were presented on slides. After a series of pre-experiment trials and training procedures over a period of one week, children were individually tested with both the visual and the auditory methods in a counterbalanced manner. An analysis of recall scores gathered immediately after each presentation revealed a strong disordinal interaction with the visual learners recalling more when the presentation was visual than when the presentation was auditory, the auditory learners recalling more when it was auditory, and the learners without a sensory preference recalling equally well under either mode of presentation with their scores falling between those of visual learners and auditory learners under each presentation method.

From an initial pool of 417 children with an average age of approximately 9.6 years, Foster, Reese, Schmidt, and Ohrtman (1976) retained ten audiles and ten visiles on the basis of their extreme scores on the Test of Auditory Perception (Sabatino & Foster, 1974) and the Multiple Choice Bender (Foster & Sabatino, 1974). Subjects were taught a series of unknown sight words during two 7-minute sessions on two separate days. Half the subjects were trained in a visual fashion the first day and an auditory fashion the second day. The order was reversed for each subject. Foster et al. described their visual and auditory treatments in the following way:

> Visual treatment conditions stressed the relationship between the sight words and pictures, illustrating these words and the word form configuration of each word. Auditory treatment conditions stressed the phoneme-grapheme relationships in the words and included use of the words in sentences. (p. 255)

Four days after the experimental training sessions, subjects were asked to read the words they had been taught under the two conditions and the number correct when taught auditorily and the number correct when taught visually were used as scores on the criterion. There was a significant ordinal interaction. Learners with a strong visual modality were particularly ineffective with auditory instruction but all other pairings of learner strength and teaching mode were statistically equal in outcome.

The study of Bursuk (1971) is unusual in the present context because it was carried out with slow readers at the tenth-grade level rather than with children in the earlier stages of learning to read. Unfortunately, the account of the instructional methods involved is vague and "would not permit another researcher or, for that matter, a practitioner to replicate them" (Arter & Jenkins, 1977, p. 288). Students classified as auditory, visual, and no preference were instructed in three brief sessions per week for one semester by either a visual approach or by a combined audio-visual approach. With the visual approach, the visual learners showed greater improvement in reading comprehension than the other two groups, but with the combined audio-visual approach, the auditory learners and the no preference learners improved more than the visual learners.

On the whole, research on the validity of the modality matching model is not encouraging. Researchers have reported 31 investigations of the interactive relationship of learner modality and instructional mode to achievement, mostly in reading, which failed to provide any support for this particular ATI DD-PT approach (Bateman, 1967; Bates, 1975; Bruininks, 1968; Cripe, 1966; Denison, 1971; Dequin, 1972; Freer, 1972; Gallistel, Curran, & Hawthorne, 1972; Gilberg, 1973; Harris, 1965; Huebner, 1969; Janssen, 1972; Jones & Aaron, 1971; Kampwirth, 1979; Meyers, 1980; Miller, 1974; Newcomer & Goodman, 1975; Ringler, Smith, & Cullinan, 1971; Robinson, 1972; Sabatino & Dorfman, 1974; Sabatino & Streissguth, 1972; Sabatino & Ysseldyke, 1972; Sabatino, Ysseldyke, & Woolston, 1973; Schleif, 1970; Serapiglia, 1973; Smith, 1971; Tyler, 1974; Vandever & Neville, 1974; Warren, 1973; Waugh, 1973). Only five studies produced results consistent with modality model expectations

(Bursuk, 1971; Cunningham, 1978; Daniel & Tacker, 1974; Foster, Reese, Schmidt, & Ohrtman, 1976; Lilly & Kelleher, 1973).

In terms of the percentage of studies supporting the modality matching model, the results of the present review are in line with those of earlier reviews. Arter and Jenkins (1977) reviewed studies which evaluated "the effects of instruction through different modalities on a common measure, such as word recognition, oral reading, reading comprehension skills, or a standardized test of reading achievement" (p. 284) and found that only one of 15 studies supported the model. Tarver and Dawson (1978) examined 16 studies dealing with the modality matching model in reading achievement and concluded that only two studies produced evidence consistent with the model. Kampwirth and Bates (1980) reviewed 22 studies of the model "concerned with children under ten years of age in which there was a clear attempt to compare auditory and visual modality preferences to visual and/or auditory methods of teaching words or other written symbols" (p. 598) and obtained evidence for modality matching in only two of the investigations.

Several researchers (e.g., Foster, Reese, Schmidt, & Ohrtman, 1976; Newcomer & Goodman, 1975; Sabatino, Ysseldyke, & Woolston, 1973; Tyler, 1974) have attributed the lack of support for the modality matching model to methodological shortcomings in the research. Most often, lack of confirming evidence has been interpreted as the result of one or more of the following: the use of unreliable assessment instruments for identifying perceptual preferences; failure to adequately specify the discrepancy between auditory and visual scores needed to be classified into a modality preference group; and failure to clearly delineate specific instructional treatments which involve only one modality. To this list could also be added the fact that several studies have an N too low to provide the power to uncover an interaction effect even if it did exist, unless, of course, the magnitude of the effect is extremely large, which is highly unlikely. It is especially disconcerting too that the five studies which did provide support for the model also have one or more of these methodological weaknesses. Tarver and Dawson (1978) feel that it is time to stop attributing research "failure" in this area mostly to methodological problems:

> It seems apparent, however, that the negative interaction findings have now been replicated in a sufficient number of studies involving a wide variety of preference assessment procedures, experimental designs, and dependent variables to warrant the conclusion that modality preference and method of teaching reading are not aptitude-treatment variables which can be matched effectively. (p. 27)

Although much effort has been expended in past reports dwelling upon possible reasons for lack of support of the general hypothesis, one must also ask just how strong the evidence is in the 13.9% of the investigations in this review which furnish support. First, the experiments of Foster, Reese, Schmidt, and Ohrtman (1976) and Cunningham (1978) put forth as evidence for the model in this review but not included in the reviews of Arter and Jenkins (1977), Tarver and Dawson (1978), or Kampwirth and Bates (1980) actually provide support for only part of the model. In the Foster et al. study, audiles did not perform significantly better on the auditory tasks then on the visual tasks and there were no significant differences between the audiles and the visiles with the visual treatment. In the

Cunningham study, there was a significant disordinal interaction but both audiles and visiles performed significantly better with the visual than with the auditory treatment. Second, the study by Bursuk (1971), included as evidence in this review and also the reviews of Arter and Jenkins and Tarver and Dawson, did not contain an auditory treatment but only a visual and an auditory-visual treatment. Third, the Lilly and Kelleher (1973) experiment included as support in this review and the review of Tarver and Dawson was excluded from the Arter and Jenkins review because it "failed to evaluate modality instructional matching on a common outcome measure" (Arter & Jenkins, 1977, p. 284). It should also be noted that Tarver and Dawson also had reservations about this study and concluded that "this investigation might more appropriately be described as one in which the relative effects of reading and listening on recall rather than the question of the preference method interaction was investigated" (p.24). Only the Daniel and Tacker (1974) experiment seems to offer unqualified support for the model.

On the basis of the research considered here, there appears to be little empirical support for the notion of matching learner modalities to instructional modes to enhance achievement. The conclusion of this review is the same as that of an earlier review by Arter and Jenkins (1977):

> A study of the research on the modality model makes it difficult to avoid concluding that either the model itself is invalid or that it is, for one reason or another, not applicable at this time, given the current state of educational programming. (p. 289)

Even though 84% of the special education teachers in a large-scale survey by Arter and Jenkins (1977) stated that they attempt to plan instruction to capitalize on the child's stronger modality, the onus is still on researchers in special education to demonstrate clearly that the model is valid and useful if the practice of modality matching is to rest on a scientific base.

Cognitive Styles

Cognitive styles refer to individual differences in the ways a person apprehends, stores, transforms, and utilizes information (Kogan, 1971, p. 244). They are preferred modes of information selection and processing acquired over the course of development and are considered to be relatively stable individual difference variables. Cognitive styles are often distinguished from ability variables (e.g., Messick, 1976) and from non-cognitive personality variables (e.g., Heidt, 1977) but others feel that this separation from personality and ability cannot be defended empirically or logically (e.g., Cronbach & Snow, 1977).

These stylistic variables have been identified and defined in several different ways and have been measured with an array of methodologies (Kogan, 1971). Among the important dimensions of cognitive style so far delineated are field independence-dependence, conceptual level, impulsivity-reflectivity, sensing-intuitive, scanning, rigidity-flexibility, leveling-sharpening, breadth of categorizing, cognitive complexity versus simplicity, constricted versus flexible control, tolerance for incongruous or unrealistic experiences, and risk taking (Kagan & Kogan, 1970; Kogan, 1971). Although writers have sometimes offered speculations about the implications of different cognitive styles for instructional design, few attempts have been made to ground such speculation in proper ATI research. What little empirical work that has been done appears to be solely concentrated on the field independence-dependence construct and the conceptual level construct.

Field Independence-Dependence

Witkin (Witkin, Moore, Goodenough, & Cox, 1977) views the field independence-dependence cognitive style dimension as a rather stable trait which has a pervasive influence on the way a person interacts with the environment. Behaving in a manner strongly dominated by the prevailing perceptual field is considered to be field dependent while acting in a less environmentally dominated fashion is considered to be field independent. The field dependent person is not overwhelmed by environmental context and is able to see parts of a perceptual field as discrete entities. Degree of field independence is usually determined by performance on Embedded Figures tests or on the Rod and Frame test where the person must ignore postural position and visual context to locate the true vertical.

Field dependent students seem less adept at cognitive restructuring tasks than those who are field independent (Witkin et al., 1977). Several researchers have therefore attempted to demonstrate significant interactions between field independence-dependence and variations in the degree of externally imposed structure in the learning experience (e.g., Coop & Brown, 1970;

Grieve & Davis, 1971; Grippin, 1973; McLeod & Adams, 1979; McLeod, Carpenter, McCornack, & Skvarcius, 1978, Rennels, 1970; Schwen, 1970; Shymansky & Yore, 1980).

McLeod and Adams (1979) tested the hypothesis that field independent students would profit most from an instructional treatment that had a minimum of guidance and structure while field dependent students would learn best with a treatment which emphasized guidance and structure. Complete data were obtained for 46 students in a teacher education course who had been randomly assigned to either a discovery (minimum guidance) or an expository (maximum guidance) instructional sequence. Students learned about numeration systems during a single class period and two posttests of knowledge of numeration systems were given two days later. On one of the posttests, there was a significant disordinal interaction, the nature of which supported the hypothesis. The results replicated those of an earlier similar study by McLeod and his colleagues (McLeod, Carpenter, McCornack, & Skvarcius, 1978).

Grieve and Davis (1971) randomly assigned 117 field independent and field dependent ninth-grade geography students to either a discovery or an expository instructional unit which lasted 11 hours. In the discovery condition, generalizations were not put into words until the end of the class period. In the expository condition, the teacher verbalized generalizations as a first step. With the full sample, there were no significant interactions for either males or females. However, with the extremes of the field independence-dependence distribution ($\underline{N} = 74$), ATI effects were found for boys.

Expository instruction was more beneficial for field dependent students; discovery instruction was better for field independent students. The results were similar on both a test of Japanese geography--the course content--and on a test of transfer to similar geographies.

Shymansky and Yore (1980) exposed a group of 35 field independent elementary education students to a series of science units which they referred to as semideductive, structured deductive, and hypothetic-deductive discovery approaches:

> The semideductive units relied on the structure of the prescriptive content area being investigated, i.e., qualitative analysis and electricity. The structured inductive units had high teacher structure directed at a descriptive content area. Teacher structure was related to selection, presentation sequence and amount of data, and lesson organization. The structured inductive units explored human blood characteristics and plant classification. The hypothetico-deductive units had both the content structure of the physical sciences and teacher structure. The hypothetico-deductive strategies required students to utilize deductive reasoning to generate and test hypotheses. The lessons were organized in such a manner as to get students to hypothesize, predict, observe, and compare expected and observed results. Simple harmonic motion and angular motion were explored in hypothetico-deductive strategy.

A group of 42 students classified as intermediate on the field independence-dependence continuum were given a parallel series of units designed to be identical to the series given to the field independent students. The instruction for each group lasted for nine to 15 hours for each unit and each unit was terminated with a written examination. Shymansky and Yore reported that the field independent students achieved significantly better in the semieductive strategy than the intermediate students. This finding is in line with expectations since the "semideductive treatment had the least inherent structure built into its design; only the content structure characteristic of the physical sciences guided the strategy" (p. 379).

Schwen (1970) carried out a study which directly varied the amount of structure in a programmed text. In a large-step version of the text, all generalizations were presented first with examples and discussion and a test was given at the end. In a small-step version, each generalization was presented individually with examples and discussion and a test of _that_ particular generalization followed immediately. Field independent students performed better than field dependent persons on a test given three weeks later with the large-step program but no differences were found with the small-step program.

There have also been failures to find any evidence of an ATI involving field independence-dependence and structure. Rennels (1970) found no ATI effects with a sample (_N_ = 78) of poor black eighth-grade slow readers who had been randomly assigned to a structured treatment, an unstructured treatment, or a control group for instruction once a week for five weeks and given an achievement test. Coop and Brown (1970) taught a series of lessons to 40 extremely field independent and 40 extremely field dependent college students using either a structured and factual or an independent problem solving approach and found no significant interactions in regard to either a measure of factual knowledge or a test of conceptual generalization. Grippin (1973) reported no ATI in a study involving field independence-dependence and a "no prompt-strong prompt" teaching program on Russian translation. Thornell (1977) found no interaction between field independence-dependence and the degree of written guidance given to the learner in relation to measures of initial learning and retention in a sample of pupils in fourth-grade.

Koran, Snow, and McDonald (1971) tested the interaction of televised versus print representations of teaching skills and the learning of analytic questions and field independence -dependence. With the televised approach, editing permitted a high degree of structure to be imposed on the sequencing of events and the capacity of the zoom lens forced the viewer to focus on relevant details. The televised treatment was superior for field dependent persons while the print treatment was most beneficial for the field independent persons. The interaction effect was clearly disordinal. Apparently, field independent persons were free to exercise their greater ability to focus on and structure information with the print treatment but were impeded in this respect with the televised treatment. On the other hand, the field dependent persons profitted from the external focusing and structuring of the televised treatment but did not have the capacity to adequately focus on and structure incoming information in the print condition.

Renzi (1974) varied the amount of feedback given to the learner in a programmed instruction study. University students were required to learn how to draw several ellipses. In the feedback condition, a correct ellipse was drawn in the text as an overlay but in the no feedback condition the correct ellipse was absent. An ordinal interaction was found. Field dependent students showed higher performance on a posttest when they were in the feedback condition but field independent students performed equally well with either version.

A rather novel study was carried out by Nebelkopf and Dreyer (1973) which seems to elucidate one way in which field independent and field dependent persons differ in their approach to learning concepts. Examination of the learning curves of field independent and field dependent persons in a concept attainment task revealed that the curve for field independent persons remained flat until the concept was attained and then jumped up abruptly while the curve for field dependent subjects rose gradually. Nebelkopf and Dreyer interpreted these findings as support for their contention that field independent persons use an hypothesis testing approach while field dependent persons use more of a "spectator approach". There were no differences on the whole between field independent and field dependent persons in the number of tests needed to grasp the concept.

Of particular relevance to CAI is the clarification of the role of reinforcement in the motivation of field independent and field dependent persons put forward by Witkin et al. (1977). Apparently, a great deal of evidence suggests that field dependent persons learn less under intrinsic motivation conditions than field independent persons but "this difference disappears when external rewards for learning are introduced, regardless of whether the rewards are material in nature or in the form of praise" (p.20) (e.g., Ferrell, 1971; Paclisanu, 1970; Steinfeld, 1973).

Two other reports dealing with CAI also deserve mention. Rappaport (1977) compared the performance and interest of field independent and field dependent community college students in a conventional lecture course and an interactive, time-shared, computer controlled, information television based course in mathematics. No significant interactions were found between field independence-dependence and instructional method. McKinnon (1982) reported that there was no significant difference between field independent and field dependent teacher education majors on a battery of computer programmer aptitude tests.

In summary, the ATI research reviewed here suggests that field dependent students profit from a higher degree of external structuring while field independent students excel when there is a greater opportunity to organize and develop structuring strategies in a personal manner. There is also some evidence that feedback showing the proper solution is beneficial for field dependent students, that field independent students use more hypothesis testing in their learning approach, that learning differences in favor of field independent students under conditions of intrinsic motivation can be equalized when external rewards are provided, that field independence -dependence does not interact with lecture views computer based approaches in relation to interest and achievement, and that field independent and field dependent students do not differ in their computer programming aptitude.

Conceptual Level

Harvey, Hunt and Schroeder (1961) developed a conceptual system theory in which individuals vary along a continuum of abstractness-concreteness which "provides the basis by which the individual relates to the environmental events he experiences" (pp. 244-245). Harvey et al. delineate four stages of cognitive functioning along the abstractness-concreteness dimension. Similar in focus to Rokeach's (1960) theory of dogmatism, "system" refers to the organizational structure through which information is processed rather than to the content of the information that is processed.

Hunt (1971) has evolved the theory into a more continuous variable he refers to simply as "conceptual level." Conceptual level represents a continuum of cognitive complexity. Persons with a high conceptual level are creative and flexible, relatively tolerant of stress, and tend to engage in a high degree of exploration, while low conceptual level persons are categorical, relatively incapable of developing their own concepts, and highly dependent upon external standards.

Hunt (1971) states that any attempts to match student conceptual levels to teaching approaches should consider the degree of structure in the strategy as the critical variable:

> The heart of the CL matching model is a generally inverse relation between CL and degree of structure: Low CL learners profitting more from high structure and high CL learners profitting more from low structure, or in some cases, being less affected by variations in structure. (p. 44)

In a study by Robertson (1973), all subjects were exposed to two teaching methods which differed in the degree of structure. Low conceptual level subjects, as predicted, judged the more structured treatment to be more helpful for learning than did the high conceptual level subjects. Surprisingly, there were no differences between conceptual level groups when they were asked which treatment they liked best.

McLachlan (1969) asked subjects to give their own impressions of Picasso's "Guernica" after being exposed to either a lecture or a discovery learning condition aimed at gaining familiarity with the painting. Persons with low conceptual level performed better in the more structured lecture than in the discovery condition. There were no differences for subjects with high conceptual level.

Hunt (1971) also mentions two other studies which lend support to the contention that instructional structure and conceptual level are interactively related to performance. Heck (1968) found that the communication skills of persons with low conceptual level improved more in a structured human relations course while persons with high conceptual level gained more from an unstructured sensitivity training group. Bundy (1968) found that a structured guide in a course on effective decision making was beneficial for administrators with low conceptual level but was detrimental for administrators with high conceptual level.

Three studies have used a more general measure of "teacher directiveness" (Tuckman, 1968) rather than structure per se (King, 1974; Tuckman, 1968; Vinson, 1977). According to Tuckman, teacher behaviors can be conceptually divided into those which are on a "structure" dimension and those which are on an "interpersonal" dimension. The directive teacher is viewed as one for whom extreme concern with order, procedure, and organization affects both the structure of the class and interpersonnal relationships with the students. On the structure dimension, the directive teacher highly structures and plans the course and classroom activity, minimizes informal and group work (and even structures it when it is used), resists breaks in the pattern through the structuring of classroom and individual activity, and places a premium on factual knowledge derived from absolute sources. On the interpersonal dimension, the directive teacher maintains formal teacher-student relationships, minimizes students' opportunities to learn from their own mistakes, uses absolute and justifiable punishment, fosters a formal classroom atmosphere, and takes absolute responsibility for grades. On each dimension, a nondirective teacher displays the converse of these practices. Generally speaking, directive teaching tends to be absolute, formal, and structured while nondirective teaching tends to be tentative, informal, and unstructured. Tuckman, in his ATI research project, found that high conceptual level students in vocational courses, showed less preference for, were less satisfied with, and tended to earn lower grades from directive teachers while students with lower conceptual levels reacted similarly to the two teaching styles. King (1974) failed to replicate Tuckman's findings using a vocational secondary school sample with grades in reading and shop classes as the dependent variables. Similarly, Vinson (1977), with a sample of Black American secondary school students, found no interactions using Tuckmen's measure of directiveness with teacher assigned grades in English and social studies as the criteria.

Tomlinson and Hunt (1971) compared the performance of 120 high and low conceptual level students in eleventh-grade under three treatment conditions which were seen as having high, intermediate, and low degrees of structure. In the high structure condition, students were given a rule followed by an example; in the intermediate structure condition, students were given an example followed by a rule; in the low structure condition, students were only given an example. At the end of each condition, though, the rule was stated and was related to an example as a review. Each condition lasted for only one study period. The content of the lesson was cognitive dissonance. An essay test was given the next day and again one week later. In the high structure condition the high conceptual level students performed worse than the low conceptual level students but in the intermediate and low structure conditions high conceptual level students outperformed the low conceptual level students. Among high conceptual level students the treatment differences were small but among low conceptual level students performance was much higher with high structure than with intermediate or low structure.

> The conclusions of this review of the interactive effects of learner conceptual level and the degree of instructional structure are the same as those of Cronbach and Snow (1977): The findings of the Hunt program suggest though weakly and inconsistently, that Low-CL students are helped by more directive teaching, whereas Highs do better when they have more control over the situation. (p. 381)

There is limited evidence that high conceptual level students profit more from an instructional strategy which leaves a great deal of the structuring to the student, while low conceptual level students benefit from the external imposition of structure.

Summary and Conclusions

Sixty-one empirical investigations of the interaction of learner modalities and cognitive styles and instructional strategies have been reviewed with an eye to their potential implications for the development of CAI software for special educators. Generally, the results of these studies have been rather disappointing.

In regard to the widely accepted practice of trying to match students with visual and auditory strengths to teaching approaches which are highly visual or highly auditory, there appears to be little in the empirical literature to support its effectiveness. Only five of 36 studies offer any evidence whatsoever for the modality matching model and only one of these provides an unequivocal demonstration of a significant disordinal interaction between student auditory and visual strengths and performance under auditory and visual teaching approaches. Furthermore, this one clear establishment of a disordinal interaction was obtained in a short duration laboratory experiment which may lack a great deal in terms of external validity.

Although studies have been reported which failed to find interaction effects with the field independence-dependence dimension, there does seem to be evidence that external structuring is negative for field independent students but positive for field dependent students, that feedback showing the proper solution is helpful to field dependent students, that hypothesis testing is more part of the field independent student's learning strategy, that external rewards can equalize the difference found in favour of the field independent students under intrinsic motivation conditions, that field independence-dependence is not predictive of suitability for a CAI or a lecture approach, and that field independence-dependence is unrelated to computer programming aptitude. Several of these findings are based on single investigations and should be accepted with caution until further replications are published.

Interaction research with the conceptual level construct suggests that externally imposed structure is beneficial to the performance of students with a low conceptual level but is detrimental for those with a high conceptual level. Again, caution should be exercised given the small number of studies in the area and the weak and inconsistent nature of the results.

On the basis of this review of the empirical literature, any implications for the design of software for use by special educators must be considered with a great deal of caution. All of the implications are based largely or exclusively on normal populations; only a marginal number of investigations employed special education populations. But without further evidence, it appears that careful extrapolation to special education populations is at least qualifiedly unwarranted. With these limitations fully in mind, the following implications are put forth:

(1) No software adaptations for high visual or high auditory learners are justified at this time on the basis of empirical research.

(2) A higher degree of external structuring in instructional software may be more appropriate for field dependent students.

(3) A higher degree of external structuring in instructional software may be more appropriate for low conceptual level students.

(4) A lower degree of external structuring in instructional software may be more appropriate for field independent students.

(5) A lower degree of external structuring in instructional software may be more appropriate for high conceptual level students.

(6) Instructional software incorporating feedback of correct solutions is suitable for both field dependent and field independent students.

(7) Instructional software not incorporating feedback of correct solutions may put the field dependent student at a disadvantage.

(8) Instructional software which makes use of an hypothesis testing approach may be more suited to field independent than field dependent students.

(9) Instructional software incorporating the principle of positive reinforcement is suitable for both field dependent and field independent students.

(10) If instructional software does not incorporate the principle of positive reinforcement, field dependent students may be at a disadvantage.

(11) CAI is suited equally for field independent and field dependent students.

It should also be noted that these implications are based in some instances on the results of a single study and in no case was consideration given to the magnitude of the effects.

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